

**Towards an Explanation of Overeating Patterns Among Normal Weight  
College Women: Development and Validation of a Structural Equation Model**

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by

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Abstract

Although research describing relationships between psychosocial factors and various eating patterns is growing, a model which explains the mechanisms through which these factors may operate is lacking. A model to explain overeating patterns among normal weight college females was developed and tested. The model contained the following variables: global adjustment, eating and weight cognitions, emotional eating, and self-efficacy. Three hundred ninety-one participants completed the following self-report indices: the Questionnaire on Eating and Weight Patterns-Revised, the Student Adaptation to College Questionnaire, the Weight Efficacy Life-Style Questionnaire, the Center for Epidemiological Studies on Depression, the State-Trait Anxiety Inventory, the State-Trait Anger Expression Inventory, the Emotional Eating Scale, the COPE, the Dutch Eating Behaviors Questionnaire - Restraint Scale, and a self-reported frequency of current eating patterns. Forty participants were excluded based on responses suggestive of obesity ( $BMI > 27.3$ ), severe dietary restraint, or bulimia nervosa, resulting in a final sample of 351. Correlational matrices, factor analysis and structural equation modeling with LISREL 8.B were progressively used to develop the best measurement model and assess the goodness of fit of the proposed structural model. The model provided an excellent fit to the data ( $GFI = .95$ ;  $AGFI = .92$ ;  $RMSEA = .048$ ) and explained as large amount of the observed variance in overeating patterns among normal weight college females ( $R^2 = .78$ ). An alternative model, which included dietary restraint as a predictor variable was also tested and compared to the proposed structural model. On all indices of model fit and model parsimony, the proposed model *without* dietary restraint appeared superior. Moreover, dietary restraint was not a significant direct contributor to the explanation of overeating patterns among normal weight college females. In the final structural model, all variables had a significant direct effect on eating patterns ( $p < .01$ ). Further examination revealed a large total effect of adjustment as well as a strong direct influence of emotional eating on overeating patterns (direct effect = .52,  $p$

<.001). Because emotional eating captures the extent to which negative emotions produce an urge to eat, treatment and prevention programs should specifically target acquisition and practice of alternative coping strategies for dealing with negative emotions.

## DEDICATION

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## Table of Contents

### Introduction

Background .....	1
Rationale for Assessing a Range of Eating Patterns .....	3
Towards Model Development: A Review of Existing Research .....	6
<i>Psychological Co-Morbidity: Anxiety, Depression, and Anger</i> .....	7
<i>College Adjustment</i> .....	8
<i>Weight and Shape Cognitions</i> .....	9
<i>Dietary Restraint</i> .....	10
<i>Emotional Eating</i> .....	11
<i>Self-Efficacy and Outcome Expectancies</i> .....	11
Additional Variables to Consider	
<i>Obesity</i> .....	13
<i>Coping</i> .....	14
Rationale for Research.....	15
Conclusions and Preliminary Model.....	16
Specific Research Objectives.....	18
Hypotheses of Proposed Research .....	19

### Methods

Recruitment .....	19
Procedure.....	20
Measures.....	21

### Results

Missing Data.....	26
Classification of Eating Patterns.....	26
Data Analysis Procedure	
<i>Factor Analysis of Select Measures</i> .....	27
<i>Preliminary Structural Equation Analysis</i> .....	27
<i>Analysis of Final Model</i> .....	27
<i>Model Comparison</i> .....	28

<i>Analysis of Anger and Coping</i> .....	29
<i>Distressed vs. Non-Distressed Binge Eaters</i> .....	29
<i>Subjective vs. Objective Binges: The Continuum Model?</i> .....	29
Participants .....	29
Data Analysis Results	
<i>Factor Analysis of Select Measures</i> .....	30
<i>Preliminary Structural Equation Analysis</i> .....	30
<i>Analysis of Final Model</i> .....	31
<i>Model Comparison</i> .....	33
<i>Analysis of Anger and Coping</i> .....	34
<i>Distressed vs. Non-Distressed Binge Eaters</i> .....	34
<i>Subjective vs. Objective Binges: The Continuum Model?</i> .....	35
<b>Discussion</b> .....	35
Final Model of Overeating Patterns Among Normal Weight College Females .....	36
<i>Adjustment</i> .....	36
<i>Weight and Shape Cognitions</i> .....	37
<i>Emotional Eating</i> .....	38
<i>Self-Efficacy</i> .....	39
Model Comparison: The Role of Dietary Restraint.....	40
Distressed vs. Non-Distressed Binge Eaters .....	41
Subjective vs. Objective Binges: The Continuum Model? .....	41
Implications, Limitations, and Future Directions.....	42
<b>List of Tables</b>	
Table 1   Distribution of Eating Patterns Among Sample with Participants Categorized into Five Mutually Exclusive Groups .....	45
Table 2   Rating of Eating Patterns .....	46
Table 3   Factor Analysis of Self-Efficacy Scale: Items and Factor Loadings ...	47
Table 4   Reliability of Measures via Internal Consistency Estimates Cronbach's Alpha.....	48

Table 5	Interrcorrelations Among Indicators of Latent Variables .....	49
Table 6	Direct, Indirect, and Total Effects - Model of Overeating Patterns Among Normal Weight College Females .....	51
Table 7	Direct, Indirect, and Total Effects - Model of Overeating .....	52
	Patterns Among Normal Weight College Females With Dietary Restraint	
Table 8	Model Fit and Model Comparison Indices for the.....	53
	Proposed Model With and Without Dietary Restraint	
Table 9	Onset of Binge Eating Versus Dieting: Does Dieting Always.....	54
	Precede Binge Eating?	
Table 10	Descriptive Data and Analysis of Variance: Level of Emotional .....	55
	Eating by Eating Category	
Table 11	Descriptive Data and Analyses of Variance on Anger Scales .....	56
	for STAXI by Eating Category	
Table 12	Descriptive Data and Analyses of Variance on Coping Scales .....	57
	by Eating Category	

### List of Figures

Figure 1	Preliminary Model of Overeating Patterns among Normal .....	58
	Weight College Females	
Figure 2	Final Model of Overeating Patterns Among Normal Weight .....	60
	College Females with Standardized Path Coefficients and Goodness of Fit Statistics	
Figure 3	Model of Overeating Patterns Among Normal Weight .....	62
	College Females with Dietary Restraint Standardized Path Coefficients and Goodness of Fit Statistics	
Figure 4	Mean Levels of Emotional Eating Domains by Eating Category .....	64
Figure 5	Mean Levels of College Adjustment by Eating Category.....	66
Figure 6	Mean Levels of Depression by Eating Category .....	68
Figure 7	Mean Levels of Anxiety by Eating Category.....	70
Figure 8	Mean Levels of Body Image Dissatisfaction by Eating Category .....	72

<b>References .....</b>	<b>74</b>
<b>List of Appendices</b>	
Appendix A Eating Patterns Measure.....	82
<b>Curriculum Vita .....</b>	<b>84</b>

Eating behavior exists along a continuum which encompasses normal eating patterns, episodic eating abnormalities, and, finally, pathological eating disturbances. Although it may be increasingly difficult to define a “normal” pattern of eating, the Diagnostic and Statistical Manual of Mental Disorders-IV (APA, 1994) has defined pathological eating patterns. Such patterns include severe food restriction, which is a cardinal symptom of anorexia nervosa, repetitive bingeing and vomiting, which is the defining feature of bulimia nervosa, and severe binge eating, which is the essential component of binge eating disorder.

The most common manifestation of disordered eating is binge eating. Binge eating has long been recognized as an abnormal eating pattern and can be a significant component of both bulimia and anorexia nervosa (DSM, APA, 1994). Episodic binge eating also occurs among a large percentage of people, most of whom have neither an eating problem nor an eating disorder. In such instances, the binge eating is less frequent and does not cause significant distress or other psychological sequela.

However, binge eating has also been repeatedly documented to exist among a subgroup of obese and normal weight individuals who do not regularly engage in inappropriate compensatory strategies, but would otherwise meet diagnostic criteria for bulimia nervosa. For these individuals, binge eating becomes significantly problematic, is expressed in conjunction with other symptoms, and may warrant a clinical diagnosis (Fairburn, 1995). Accumulating evidence on the existence of binge eating, in the absence of a bulimic syndrome, culminated in a proposal for a new diagnostic category in the 4th edition of the DSM - Binge eating disorder (BED). Although the DSM-IV task force concluded that sufficient consensus was lacking in regard to the utility of BED as a distinct diagnostic category, it was retained in the appendix as a potential disorder in need of further investigation and as a special case of Eating Disorder - Not Otherwise Specified.

Binge eating is defined similarly by the DSM for both binge eating disorder and bulimia nervosa. Specifically, binge eating is defined by eating an unusually large amount of food in a discrete period of time as well as a sense of lack of control during the eating episodes. Because binge eating is the primary behavioral expression in BED, additional descriptions of binge eating are included in the proposed diagnostic criteria. Specifically, in order to meet diagnostic criteria for binge eating disorder, binge eating must be associated with at least three of the

following symptoms: (1) eating much more rapidly than normal; (2) eating until feeling uncomfortably full; (3) eating large amounts of food when not feeling physically hungry; (4) eating alone because of feeling embarrassed about the quantity of food one is eating; or (5) feeling disgusted with oneself, depressed, or very guilty after overeating. In addition, marked distress must accompany the binge eating, occurring a minimum of two days a week, on average, for 6 months. Finally, the bingeing must not be accompanied by the regular use of inappropriate compensatory behaviors (APA, 1994).

Several large, multi-site field trials of the diagnostic criteria for BED have been conducted to determine the prevalence and validity of binge eating disorder (Spitzer et al., 1992; 1993). The Questionnaire on Eating and Weight Patterns - Revised has been used as the primary diagnostic measure. Individuals from weight loss treatment programs, nonpatient community samples, and college students have been assessed. Across studies, obese individuals seeking treatment meet criteria for BED most often. In fact, Spitzer and colleagues (1992; 1993) found mean prevalence estimates of BED ranging from 28.8% - 30.1% of those assessed via weight control programs. Among the community and non-obese college samples, prevalence rates of BED were 4.6% and 3.6% respectively. Although the prevalence of BED among the college sample was modest, the cumulative prevalence of other binge eating syndromes (e.g., binge eating without distress) was 17.1% (Spitzer et al., 1992). Among the college samples, BED was not statistically more common in females than in males; however, episodic binge eating was more common in males, suggesting that males who binge eat are much less likely to have the associated symptoms of loss of control and distress during such episodes. Furthermore, whereas bulimia and anorexia typically occur in Caucasian females, there appeared to be no appreciable difference in prevalence estimates for BED among Caucasians and African-Americans in the college samples (Spitzer et al., 1992; 1993).

Binge eating disorder is not synonymous with obesity. While many obese individuals report episodic overeating or binge eating while feeling out of control, far fewer report these symptoms often enough or with distress (Spitzer et al., 1992;1993). In fact, initial estimates suggest that only 5 - 8% of obese individuals within the community meet criteria for the BED (Bruce & Agras, 1992). Moreover, in nonpatient community samples, only half of those meeting criteria for binge eating disorder were obese (Spitzer et al., 1992;1993). However,

because the criteria for binge eating disorder include the absence of a compensatory strategy, it is probable that individuals with frequent binge episodes are overweight or will eventually become overweight if this eating pattern persists. To the extent chronic binge eating predicts increased weight, it becomes a significant health problem because of the substantial health risks for coronary heart disease (CHD) associated with even moderate weight gains after age 18 (Willett et al., 1995). Furthermore, it has also been documented that higher levels of body weight, even within the “normal” range also portends increased risk for CHD among middle-aged women (Willett et al., 1995). A similar linear pattern of risk with increased body weight, as well as even modest weight gains ( e.g., 5 kilograms) from age 18, have been adequately documented to be associated with adult-onset diabetes, stroke, hypertension, and hypercholesterolemia (Willett & Manson, 1995). These data have been used to suggest that even modest weight loss can be associated with decreased risk for similar diseases. Again, to the extent current binge eating episodes make it less likely to lose excess weight or more difficult to maintain a stable weight after age 18, further understanding how the risk and protective factors interact to explain overeating patterns is highly indicated.

### **Rationale for Assessing a Range of Eating Patterns**

Eating patterns labeled as “pathological” have undoubtedly received the most theoretical and empirical attention to date. However, despite evidence which suggests it is possible to reliably and validly distinguish among subgroups of individuals with eating-related pathology, it remains debatable whether it is useful to study eating patterns in this restrictive, categorical manner (i.e., only study those individuals which fall into a DSM classification of disordered eating). In fact, many support a more continuous and qualitative model of psychopathology due to some of the limitations of the current system (Barlow, 1991). For example, the DSM is a reflection of the medical model that assumes accurate diagnoses offer specific suggestions for a treatment protocol. However, in human psychopathology, the diagnostic system is polythetic (i.e., a subset of possible symptoms must exist but this subset may vary across individuals with the same diagnosis thereby increasing heterogeneity) (Nelson-Gray, 1991) and there exists a relatively weak link between diagnostic categories and treatment protocols. Although it can be useful to identify relatively homogeneous subgroups of individuals to examine etiology, typical presentation, treatment effectiveness, prognosis, and response to treatment this approach should

not be used in isolation. Exclusive reliance on gathering empirical data from subgroups of individuals labeled pathological by the DSM pervades many research domains and leaves much to be desired in terms of understanding *behavior* and developing effective treatment and prevention interventions (Hickey, 1998). Thus, a dimensional view of eating pathology and a set of methodologies that study eating *behaviors* along the continuum may further contribute to the field.

Evidence exists which has helped to elucidate the how the constellations of eating disordered behaviors might fall along the continuum, according to both the severity of eating behaviors (e.g., resistance to treatment) as well as concomitant psychological factors and health outcomes. Specifically, individuals expressing the symptoms which constitute anorexia nervosa may be the most severe, both in terms of their behavioral expression and in terms of their psychological distress, treatment outcome, and mortality. The cluster of symptoms seen among individuals with bulimia nervosa appear to be the next most severe, with numerous studies documenting coexisting psychopathology. Most recently, there have been numerous studies enumerating the distinctions between individuals with bulimia nervosa and binge eating disorder. Findings from these studies suggest binge eating disorder represents a less severe manifestation of problematic eating as well as less severe presentations of concomitant psychopathology (Russ, 1996). However, beyond these three DSM-IV eating disorders, there exists numerous variants and sub-clinical manifestations of disordered eating patterns, including overeating, binge eating, restrictive eating, and compensatory strategies in the absence of bingeing. It is unclear where these behavioral patterns fall along the continuum of eating behavior or when they become “abnormal.” In addition, it is unclear whether the same set of variables are predictive of these various eating patterns or if each subgroup of symptoms is distinctly explained by a unique set of variables. Again, methodologies using community samples of individuals expressing a range of eating behaviors may be most instructive in answering some of these questions. This study specifically explored a non-obese college sample in order to capture some heterogeneity of eating patterns.

The importance of examining the range of binge eaters is further underscored by recent data that have raised the question of whether subthreshold BED symptoms are clinically meaningful. Binge eating has been operationally defined by the DSM and many assessment

instruments to include consuming an unusually large amount of food in a relatively short period of time with a concomitant feeling of loss of control. However, binge eating is also subjectively defined by women. Some women may label consumption of a small amount of food consumed a binge episode because they eat when they are not hungry or they eat high fat foods (i.e., “forbidden foods”), and feel out of control. This has often been labeled a “subjective binge.” Several research studies have documented extreme variability in binge episodes reported by clinical populations (i.e., bulimics), concluding that the size of binge episodes may not be as diagnostically relevant as once believed (Garner, Shafer, & Rosen, 1992). However, little research has been conducted to investigate whether non-clinical individuals experiencing subjective binge episodes share similar features with objective binge eaters. There is some evidence to suggest that only the amount of calories consumed during the binge episodes accurately differentiates “objective” and “subjective” bingers, whereas the subjective experiences of both groups are similar (Jansen, van den Hout, & Griez, 1990). Moreover, at least one recent study also suggests the distinction between subjective and objective binge episodes may not be clinically meaningful. For example, subgroups of subjective and objective binge eaters did not significantly differ on measures of psychopathology that often effectively differentiate binge eaters from “normals” (Niego, Pratt, & Agras, 1997). These authors further suggested that the consumption of an unusually large amount of food in a relatively short period of time is less relevant in defining a binge episode than the perception of loss of control (Niego, et al., 1997). This conclusion was further supported by data which suggested treatment approaches are more effective at reducing the amount of food consumed than reducing the cognitive distortions associated with food and the corresponding loss of control (Niego et al., 1997). That is, perceived loss of control is less responsive to treatment interventions. In fact, it has been suggested that the definition of a diagnostic binge be adopted to de-emphasize or exclude the “large amount of food” criterion (Telch & Agras, 1996).

Because many women report feeling out of control in the absence of consuming a large amount of food, such an adjustment to the definition of a binge episode may artificially increase both the prevalence of binge eating disorder as well as the percentage of individuals who meet these diagnostic criteria but are of normal weight. Therefore, it must first be determined whether such cognitive distortions are normative for a sample of college women, diagnostically

relevant, or portend other serious problems. In this research, both objective and subjective binge episodes were assessed to gain additional understanding on this issue.

### **Towards Model Development: A Review of Existing Research**

Existing research on the etiology and maintenance of disordered eating has provided substantial data on variables that are related to disordered eating patterns; it is clear the etiology and maintenance of maladaptive eating is multifactorial. Ultimately, the development and maintenance of an eating disorder depends on the dynamic interplay between the occurrence of circumstances that activate an individual's vulnerability to particular risk factors, maintenance factors, as well as the operation of protective factors. Although a variety of variables have been explored, ranging from intrapersonal to interpersonal factors and social influences, most of the extant empirical studies have examined potential risk factors in isolation with little, if any, attention allocated to determining how such risk factors might interact. The potential mechanisms through which various risk factors might exert their influence on eating patterns has also not been examined. Moreover, initial etiological factors have been studied significantly more than factors that may continue to maintain disordered eating. The factors which are most salient in the *development* of particular eating patterns may exert a less influential role in the *maintenance* of the behavior. Many of these etiologic variables are not mutative and can be labeled 'predisposing factors.' Although many of these factors may be less instructive for informing treatment protocols, they can be helpful guides in developing prevention programs. The mutable factors which have been found to be related to disordered eating patterns are often more informative for treatment, and can be viewed as either 'precipitating factors' or 'maintenance factors.' This research focused exclusively on current factors, rather than historical factors, that are believed to be important in the maintenance of disordered eating patterns.

Although the empirical literature on binge eating is growing, many of the variables of interest in this study have not yet been empirically examined with a broad sample of eaters. Thus, the literature presented for the variables of interest in this study are discussed given the caveat that many of the proposed variables have not been adequately examined among non-obese women, college women, or among the range of binge eaters. In addition, most research to date suggests different relationships, and perhaps different mechanisms, exist among individuals with bulimia nervosa and anorexia nervosa as compared to individuals who do not compensate

via excessive fasting or purging (Russ, 1996). Thus, most of the literature reviewed here will pertain to binge eating as it has been researched among those with binge eating disorder.

Specifically, empirical findings on the following domains will be briefly reviewed:

psychological co-morbidity, college adjustment, weight and shape related cognitions, dietary restraint, emotional eating, self-efficacy and outcome expectancies, level of obesity, and coping.

**Psychological Co-Morbidity: Anxiety, Depression, and Anger.** Several studies, using structured diagnostic interviews, have documented increased prevalence of DSM Axis I psychological disorders among individuals meeting criteria for BED. The most frequently diagnosed disorders include increased lifetime prevalence of major depressive disorder, dysthymia, panic disorder, borderline personality disorder, avoidant personality disorder, social phobia, somatization disorder, and alcohol abuse (Yanovski, Nelson, Dubbert, & Spitzer, 1993; Marcus, Wing, Ewing, Kern, Gooding, & McDermot, 1990; Spitzer et al., 1993). Although social phobia also appears to be common among individuals with binge eating disorder, evidence suggests that an independent anxiety disorder is typically not present. Anxiety symptoms are usually an expression of fear regarding eating in public, social situations involving eating, and a fear of having one's body exposed to scrutiny. Although these fears have, repeatedly, been eliminated with the normalization of eating habits (Smith, Marcus, & Eldrege, 1994), the anxiety symptoms are likely inextricably linked to the patient's maladaptive cognitions regarding food and weight and may contribute to the maintenance of binge eating.

The most consistent type of psychopathology associated with binge eating disorder has been an increased prevalence of depression, whether it be clinical or subclinical levels of psychopathology (Smith, et al., 1994). Estimates of lifetime prevalence of depressive disorders range from 24% to 51% for binge eating disorder (Marcus et al., 1990; Specker, deZwaan, Raymond, & Mitchell, 1994; Yanovski et al., 1993). In fact one study reported binge eaters to be 12.9 times more likely to report a lifetime history of major depression as compared to non-binge eaters (Yanovski et al., 1993). Considering the level of endorsement on some of the atypical features of depression such as hypersomnia, fatigue, hyperphagia, and weight gain, the role of these symptoms in the development and/or maintenance of obesity is important to consider among this subgroup. Although prospective studies are lacking and retrospective studies have inherent methodological difficulties when trying to assess temporal sequences of events, there is

some evidence to suggest that depressive symptoms develop following the onset of an established pattern of binge eating and, perhaps, weight gain as well (Marcus et al., 1990).

The hypothesis that depression arises as a consequence of binge eating disorder is indirectly supported by evidence that self-reported indices of mood closely parallel perceived control over eating and that significant improvements in mood are observed secondary to improvements in eating patterns (Cooper, 1995). Moreover, among most individuals with binge eating disorder, depression is not a prognostic indicator for treatment effectiveness, which further suggests that depression is a consequence, rather than a cause of binge eating disorder (Cooper, 1995). Nonetheless, depression may exacerbate or at least help to maintain the disordered eating pattern in BED. In fact, among binge eating disordered individuals who report elevations on symptoms of atypical depression (e.g., hypersomnia, hyperphagia; Marcus et al., 1990), depression may increase the likelihood of weight gain, exacerbate internal and negative cognitions, as well as create additional opportunities to binge since negative affect and the anticipation of mood alteration appear to be common precipitators for a binge episode. In sum, numerous studies have documented an association between negative affect and binge eating; however, the mechanism by which negative affect influences binge eating is unknown.

Anxiety and depression have been the most researched forms of negative affect; however, anger could also be an important factor to consider. Anger has been a largely understudied construct among women in general, particularly with respect to disordered eating. In fact, anger has only been researched as an immediate precursor to binges (Arnow & Agras, 1996) but not as a more global construct. Although prior literature cannot lend empirical support to its inclusion in an explanatory model of eating patterns, it is of theoretical interest as a form of negative affect.

**College Adjustment.** Despite the developmental significance of going away to college, few researchers have examined the potential influence of adjustment difficulties during this significant transition with the onset or exacerbation of disordered eating patterns. However, in one of the few prospective analyses, Striegel-Moore, Silberstein, Frensch, & Rodin (1989) assessed incoming freshman prior to and at the completion of the academic year. Only a few students developed bulimia nervosa during their freshman year of college; however, a significant number of females reported an increase in eating disorder symptomatology, including dieting,

binge eating, and negative feelings regarding one's weight. Although this specific study is informative, further data was not collected to examine whether the increased eating-related symptomatology evolved into a clinically significant eating disorder over time or remained at a sub-clinical level. Moreover, it is unclear whether the occurrence of these symptoms was related to level of college adjustment. Binge eating, similar to alcohol use, may be normative in a college population; however, this behavior may be inappropriately used as a coping strategy among a significant percentage of women who adopt this behavior in college. These women may not be able to curtail this behavior once out of college or may not be able to minimize the extent to which it is done while in college. Binge eating may then become a precursor to bulimia nervosa or, in the absence of compensatory strategies, may lead to binge eating and obesity among a substantial percentage of women. For this reason, the exploration of college adjustment as a relevant variable in explaining eating behaviors is warranted.

**Weight and Shape Cognitions.** Social and cultural influences are critical in defining appropriate weight and shape for young women as well as determining the extent to which weight and shape are important determinants of self-worth, esteem, and status. Because nearly all women are exposed to these influences, perhaps the most important predisposing risk factor is the extent to which body dissatisfaction and weight preoccupation are developed in response to the internalization of physical appearance ideals. Slight body dissatisfaction is extremely common among American women, however, if it is not excessive and does not interact with other predisposing or precipitating factors, it will likely remain as normal discontent and not proceed to the development of binge eating disorder or any other eating disorder syndrome (Smolak & Striegel-Moore, 1996). Several researchers have documented that the extent of internalization of beauty ideals may be related to one's social context. That is, individuals whose social identity is among a group who emphasizes weight and shape may be more likely to internalize a thin body ideal, increase drive for thinness, and adopt problematic eating behaviors (Striegel-Moore, 1993). Overconcern for weight and shape in self-evaluations (i.e., weight and shape are primary to one's perception of self-worth) is *not* one of the diagnostic features for binge eating disorder in the DSM-IV. Eldredge and Agras (1996) explored the role of weight and shape concerns among a sample of obese individuals with BED and demonstrated that among the obese, weight does not appear to influence the significance attached to weight and shape in

an individual's self-evaluative scheme; the presence of binge eating disorder, however, is related to such concerns. This finding raises some interest regarding the exclusion of this criterion in the proposed diagnostic criteria, although further evaluation of this construct is indicated.

**Dietary Restraint.** Dieting has become increasingly normative in the past 25 years, particularly among young women in Western society, and has been an hypothesized contributor to eating disturbances, such as binge eating. Dieting refers to the intentional replacement of internally regulated eating (i.e., hunger-driven) with planned, cognitively determined, diet-approved eating, or dietary restraint (Restraint Theory; Polivy & Herman, 1995). The restrained eater ignores internal signs of hunger (and satiety) and adheres to a calorically reduced eating plan that will presumably lead to weight loss. Unfortunately, ignoring internal signals of hunger and satiety often results in the disruption of normal caloric regulation and has therefore, been hypothesized as a triggering factor for the development of binge eating (Polivy & Herman, 1985). In several empirical studies, dieting has been significantly related to increased disinhibition following a preload with a food that is perceived to be fattening. This phenomenon has been labeled "counterregulation," suggesting that dieters do cognitively regulate their intake and tend to overeat when they believe their restrictive diets have been breached as well as in other situations, such as when they feel intoxicated or emotionally distressed (Polivy & Herman, 1995). Moreover, a clear link between fasting and binge eating does exist in prospective studies of extreme dieting (i.e., binge eating subsequent to weight loss and physiological changes). However, this is not the typical intensity of restraint that is reported among women, which has led to controversy regarding the relationship between dietary restraint and binge eating (Tuschl, 1990). Moreover, it is also true that a large majority of the individuals who diet do not develop an eating disorder. In fact, no relationship between dietary restraint and counterregulation, among non-eating disordered samples, has been found in the laboratory (Dritschel, Cooper, & Charnok, 1993; vanStrain, 1996), suggesting that dietary restraint may only lead to binge eating among those individuals with pre-existing eating pathology. Thus, dieting alone is insufficient to explain the etiology or maintenance of binge eating; however, the question still remains as to whether dieting is a necessary factor. Two competing models will be examined in this research to address the empirical question of whether dietary restraint is a contributing variable to the explanation of overeating patterns among normal weight college females.

**Emotional Eating.** Emotional eating can be defined by the tendency to eat in response to specific emotions, rather than in response to physiological signs of hunger. The literature exploring the construct of emotional eating has grown from studies that consistently found stress and negative mood states to be the primary precipitants of binge episodes (Polivy & Herman, 1993). However, there have been only limited attempts to assess and identify specific negative mood states that are more likely to precipitate binge episodes or whether these precipitants vary across subgroups of binge eaters. As described above, the co-occurrence of depression, anxiety, and anger have been found among binge eaters; however, the presence of these symptoms does not necessarily imply a causal relationship to binge eating specifically. For example, depression, anxiety, and anger are also highly related to other psychological disturbances (e.g., substance abuse). Thus, having these symptoms is not sufficient for the onset of binge eating. However, if these symptoms are coupled with other factors, such as the tendency to have a strong urge to eat in response to these emotions, repetitive binge eating may occur.

Although depression and anxiety have received the most attention and support for negative mood states which precipitate binge episodes (Lingswiler et al., 1989a), these are not the only negative emotions which may influence binge eating (Arnou, Kenardy, & Agras, 1996). Anger has also been found to be an aversive emotional state which causes distress and, perhaps, a desire to engage in binge eating as a means to reduce the emotional state or replace it with a less aversive emotion, such as guilt (Kenardy, Arnou & Agras, 1996). In a descriptive study of binge eaters, Arnou and colleagues (1992) found anger and frustration to precede binge episodes 42% of the time, compared with depression which only preceded binges 16% of the time. Moreover, subjects who tend to binge eat in response to either anger or depression were more likely to gain weight prior to the start of a treatment program, as compared to individual who tended to binge eat in response to anxiety (Eldrege, et al., 1997). Depression, anxiety, and anger all appear to be important negative mood states which precipitate binge eating and, therefore, warrants further empirical consideration.

**Self-Efficacy and Outcome Expectancies.** The role of self-efficacy and outcome expectancies in binge eating has not been adequately considered from either an empirical or theoretical perspective. Both constructs arise from social cognitive theory. In the case of binge eating, self-efficacy refers to one's confidence in one's ability to avoid binge eating, particularly

when the temptation to binge eat is present. Considering the suggestion that an increase in available coping responses may decrease the necessity of using binge eating to cope with negative affect or perceived stress, the examination of an individual's self-efficacy for invoking such alternative responses seems warranted (Grilo, Shiffman, & Wing, 1989). Self-efficacy may be influenced by a lack of knowledge or experience with alternative coping responses as well as by one's level of depression and eating-related cognitions. Depression, anxiety, or anger may exacerbate one's feelings of inability to use alternative coping responses even when one is aware of alternative responses. In addition, pathological eating-related cognitions may distort one's perceptions of available responses. Thus, increased self-efficacy to adequately respond to negative affect or interpersonal dilemmas, without binge eating, may serve as a protective factor to diminish the probability of repeated binge episodes.

One of the reasons self-efficacy may be an important construct in the protection against the onset and maintenance of repetitive binge eating is because of evidence which suggests the cognitive attributions made in response to an unsuccessful diet or an episode of over-indulgence can be instrumental in maintaining binge eating (Grilo & Shiffman, 1994). The experience of significant distress and the tendency to catastrophize in response to such events suggest that self-esteem and self-worth are being increasingly defined by factors pertaining to body weight and shape (Stice, 1994). Subsequent body dissatisfaction and weight preoccupation establish a situation in which every encounter with food is significantly laden with emotional meaning, such that food is no longer merely physical sustenance, it becomes emotional sustenance as well.

For example, lapses in behavioral self-control (i.e., a binge) results in an increased probability of escalation of problematic behavior based on the cognitive attributions of causality for the lapse as well as one's subsequent affective reaction to the attribution. In a prospective empirical investigation of this theory, Grilo and Shiffman (1994) suggested a central role for the cognitive attributions in maintaining repeated episodes of binge eating. Among binge eating disordered individuals, cognitive attributions about binge eating were internal, global, and uncontrollable. Moreover, the accompanying affect was mostly guilt, some dichotomous thinking, low self-efficacy for avoiding a binge, and moderate negative affect. Furthermore, among those binge eaters that see lapse as uncontrollable, little or no coping attempts were employed to avoid the binge, much like the learned helplessness phenomenon observed with

depression (Grilo & Shiffman, 1994). Further support for the role of cognitive mechanisms in the maintenance of binge eating was provided in a naturalistic functional analysis of binge eating among binge eating disordered individuals as well (Johnson, Schlundt, Barclay, Carr-Nangle, & Engler, 1995).

In binge eating, outcome expectancies refer specifically to one's perception of the consequences of engaging in binge eating. Although outcome expectancies, per se, have not been empirically examined, the utility of this construct in explaining the maintenance of binge eating has been supported. For example, a prospective, controlled investigation of binge eating as it occurs in bulimia and binge eating disorder, suggested that negative mood is an important precipitating factor in the onset of binge eating (Lingswiler et al., 1989a). The most common feelings reported prior to binge eating included anger, frustration, anxiety, agitation, sadness, and depression (Arnow et al., 1992). Moreover, naturalistic functional analyses revealed that the most common cognitions reported immediately prior to a binge are the intention to overeat as well as the belief that doing so will result in mood alteration and feeling better (i.e., outcome expectancy; Johnson, et al., 1995). In fact, mood changes are the most often cited reason for the precipitation of a binge and individuals with binge eating disorder typically report feeling some pleasure during a binge, although a subset of individuals may feel "numb" (Lingswiler et al., 1989b). Thus, binge eating may be an attempt to diminish dysphoria and other negative emotions as it typically provides significant relief from these negative mood states. However, only temporary relief is achieved. Although feelings of self-reproach and guilt appear to predominate following a binge eating episode, perhaps the self-soothing nature of binge eating is its ability to replace feelings of depression, anger, and anxiety with more positive, pleasurable emotions, at least *during* the binge. It is this endowment which may increase the probability of repeated binges in response to subsequent negative mood states. Specifically, one's outcome expectancy for engaging in binge eating is the immediate, albeit temporary, relief of negative affect.

### **Additional Variables to Consider**

**Level of Obesity.** Numerous empirical studies have adequately documented the relationship of increased psychopathology among individuals with binge eating disorder. While some researchers have provided evidence that the occurrence and severity of BED may be

related to increased adiposity (Bruce & Agras, 1992; Telch et al., 1988), others have suggested that the severity of psychopathology is proportional to the severity of the binge eating (deZwaan et al., 1994; Wadden, Foster, Letizia, & Wilk, 1993). Among a sample of obese individuals with and without binge eating, no significant differences on weight or percent body fat were noted. However, statistically and clinically significant differences were noted on psychopathological indices, such as depression, and eating related pathology, among binge eaters as compared to the non binge eaters, with the former group elevated on all indices (Wadden et al., 1993). Moreover, Telch & Agras (1994) reported no relationship between obesity and psychopathology, but did indicate an association among binge eating severity and psychopathology. In conclusion, there appears to be overwhelming evidence in support of the valid distinction between binge eaters and non-binge eaters. Furthermore, because most of the studies included an obese non-binge eating control condition, they have provided convincing evidence that these relationships exist independently of the degree of obesity. What is not clear, however, is whether these same relationships exist among normal weight individuals with and without binge eating. Non-obese groups have not been adequately examined on the above dimensions to conclude whether these seemingly concomitant psychological indices are an artifact of the samples.

**Coping.** Although the role of coping as a risk factor and, potentially, a protective factor, has received little empirical attention, it has been hypothesized that coping is involved with binge eating. Moreover, it has been demonstrated that the use of an adequate coping response when faced with the temptation to binge was positively related to treatment outcome and lower relapse rates (Grilo et al., 1989). Thus, a deficiency in coping skills or use of avoidant coping may be associated with repeated binge eating. For example, binge episodes are typically precipitated by negative affect when an individual is alone and by positive affect when an individual is in a social situation (Grilo, Shiffman, & Carter-Campbell, 1994). That is, some prominent affective state typically precedes binge eating such that the ability to cope with salient emotions in alternative and more adaptive ways may decrease the likelihood of binge eating (Stice, 1994).

Among non-clinical sample, higher levels of avoidance coping and lower levels of active coping have been associated with disordered eating patterns (Mayhew & Edelman, 1989) as well as higher levels of emotion focused coping (Fryer, Waller, & Kroese, 1997). Several studies

have also explored the relationship of avoidant coping strategies with symptoms of bulimia which have yielded inconsistent results. One recent study determined that avoidance coping, although highly correlated with binge eating, did not uniquely contribute to the prediction of binge eating in a non-clinical college sample, once controlling for the influence of depression (Paxton & Diggins, 1997). In addition, Paxton & Diggins failed to find difference on level of avoidant coping among binge eaters as compared to restrained eaters. However, the process used to identify the binge eating sample (i.e., top 10% of sample on a binge scale) may not have sufficiently captured a sample of binge eaters and the only form of avoidance coping assessed was mental or emotional avoidance. Although further research on the contribution of avoidance coping is indicated for binge eaters, it is unclear how this construct might operate in a mechanistic model. Thus, the relationship between coping styles and eating patterns will be examined in this study, but a particular type of coping was not hypothesized as a contributor to the explanation of overeating patterns.

### **Rationale for Research**

Although a substantial amount of evidence exists which relates certain types of psychopathology with BED, convincing evidence has not been provided which links these same associated factors with binge eating among different populations. Research samples studied to date have been fairly limited and selective. With the exception of a few community studies, the samples of binge eating individuals have been extremely biased towards women, the obese, and individuals presenting for treatment. Although nearly one half of binge eating disordered individuals are obese females, a substantial group remains whom have not been adequately studied. One obvious reason for this selectivity bias is because obese females are more likely to present for treatment (Fitzgibbon, Stolley, & Kirschenbaum, 1993). However, this too raises substantial concern for gathering evidence on the associated features of binge eating. Individuals who present for treatment are more likely to exhibit concomitant psychological disorders, or at least additional symptomatology (i.e., Berkson's bias). Moreover, findings from "patient" populations cannot always be generalized to non-patient populations. Thus, in the absence of community-based studies, specific conclusions regarding the prevalence of associated psychological symptoms and disorders would be misleading.

As previously noted, research on binge eating has also largely ignored the important relationship between normal and pathological development. A dimensional view of psychopathology is not necessarily mutually exclusive from a categorical taxonomy; the two approaches can be applied in a complimentary fashion to enhance knowledge and clinical science. Eating disorders exist on a continuum, from normal eating behaviors to normal discontent with one's body and episodic eating abnormalities to clearly pathological eating patterns, with anorexia nervosa at the extreme. The symptomatology present in binge eating disorder likely falls somewhere between normal discontent and bulimia. Empirical examination of individuals exhibiting *behaviors* along the entire continuum would provide a wealth of information pertinent to assessment and treatment. Currently, very little is known about the protective factors for binge eating, mainly because only "abnormal" patterns of eating behavior are empirically studied. It may be that binge eating disordered individuals who are not obese have some additional protective factors which prevent excessive weight gain (e.g., higher self-efficacy or increased coping alternatives). In addition, perhaps individual who binge eat, but do not report concomitant distress, also have some protective factors which may enable them to overcome binge eating and adopt a more effective coping mechanism.

### **Conclusions and Preliminary Model**

Empirical findings from each of the variables reviewed were instrumental in determining the sample to be studied and in constructing the preliminary explanatory model of overeating patterns among normal weight college women (See Figure 1). The preliminary model depicted in Figure 1 specifies the hypothesized relationships between each of the variables and overeating patterns. Because this model was an initial attempt to explain the influences on overeating patterns, all potential paths were specified (i.e., a fully recursive model).

In the proposed model, college adjustment, negative affect (anxiety and depression) and anger are correlated exogenous variables. These variables are believed to be influenced by numerous factors; however, it is not the goal of this research to identify those contributors. Weight and shape dissatisfaction is believed to be influenced by each of these factors. The importance one places on weight and shape is thought to be exacerbated by poor college adjustment, increased depression, anxiety, and increased anger. Emotional eating, or the tendency to respond to negative emotions with an urge to eat, is hypothesized to be influenced

by negative affect, poor college adjustment, and anger as well. Increased levels of depression, anxiety, or anger may increase the frequency one experiences negative emotions. When this is coupled with body dissatisfaction, emotional eating may be used as a means of affective regulation or temporary alleviation of the negative emotional state. Self-efficacy to avoid binge eating is also hypothesized to be directly diminished by poor college adjustment, negative affect and anger as well as indirectly via weight and shape dissatisfaction and emotional eating. Emotional eating is also thought to directly influence self-efficacy. The stronger one's urge to overeat when faced with negative emotions, the less confident one may feel to resist the urge, particularly if eating is thought to reduce or temporarily alleviate the uncomfortable emotional state. Finally, each of these variables is believed to directly contribute to overeating patterns. Specifically, college adjustment is thought to be negatively related to overeating patterns, such that better adjustment correlates with less disordered eating. Negative affect and anger are believed to be positively related to overeating patterns, with more depression, anxiety, and anger contributing to more disordered eating. Weight and shape cognitions are also believed to be positively related to overeating patterns, with higher levels of body dissatisfaction influencing more disordered eating. Emotional eating is hypothesized to be positively related to overeating patterns with more emotional eating corresponding with higher levels of disordered eating. Finally, self-efficacy is hypothesized to be inversely related to overeating patterns, with higher levels of self-efficacy contributing to lower levels of disordered eating.

Although eating-related cognitions have often been cited as a causal construct in disordered eating, this model attempted to go beyond this variable to increase understanding of *how* this variable might contribute as well as examine more mutable factors that may explain various patterns of overeating. This may allow treatment protocols to address aspects other than attitudes related to weight and shape, which are highly intractable with current treatment approaches (Wilson, 1998, personal communication).

The model depicted in Figure 1 is based on theoretical foundations and empirically derived variables; however, the measurement structure of these variables is less clear. The purpose of this research was to first confirm the structure of the proposed variables in the model and subsequently use these confirmed variables in a structural equation analysis of the resulting model. Thus, a confirmatory factor analysis was conducted to derive the latent variables to be

tested in a final model explaining overeating patterns among normal weight college females. This model was then refined as suggested by the analysis to create a final model of overeating patterns among normal weight college females. Because the same data was used to develop, modify, and test the final model, these findings must be confirmed with an independent sample of normal weight college females.

### **Specific Research Objectives**

The primary goals of this research project were the following:

1. In conjunction with theory and existing literature, use the data to develop a parsimonious model to explain patterns of overeating among normal weight college females.
2. Within the developed explanatory model:
  - a. Examine the goodness of fit of the proposed explanatory model to the data obtained.
  - b. Determine to what extent each of the proposed factors contributes to overeating patterns among a sample of college women. (i.e., determine the direct and total effects of each variable).
  - c. Provide suggestions for model improvement and future tests of the model with an independent sample of college females.
3. Compare the final model developed in Objective 1 above with an alternative model which includes dietary restraint as a contributor to overeating patterns among normal weight college females (See Figure 2).
4. Determine to what extent the full BED syndrome (i.e., binge eating plus distress) exists within a college sample and to what extent the proposed factors, or a subset of these factors, are critical in predicting whether a student who exhibits binge eating is distressed. Distinguishing the factors which may be most predictive of meeting full diagnostic criteria for BED could provide suggestions for primary targets in treatment interventions. Moreover, the factors predictive of distress may also provide some additional information on risk factors for other types of eating disorders, such as the development of bulimia. For example, if one becomes distressed enough about binge eating and its inherent sequela, experimentation with compensatory strategies may commence.
5. Examine how global coping styles and anger, two relatively unexplored variables, may be related to overeating patterns among normal weight college females.

6. Examine whether the distinction between subjective and objective binge episodes is a relevant and useful distinction based on concomitant symptoms of distress and adjustment.

### **Hypotheses of Proposed Research**

1. Analysis, modification, and refinement of the preliminary model will result in a final model of college women's overeating patterns that explains a significant portion of the amount of variance observed in eating patterns among college women. Although each variable was hypothesized to have a significant direct effect on overeating patterns, the relative magnitude of these influences is thought to vary. Specifically, emotional eating and self-efficacy/outcome expectancies were hypothesized to have the largest direct influence on eating patterns.
2. The proposed model (i.e., the model without dietary restraint) is hypothesized to be more parsimonious and achieve a better fit to the data than a model which includes dietary restraint as a contributor to the understanding of overeating patterns. In addition, the model which includes dietary restraint is hypothesized to account for no additional variance, compared to the proposed model which excludes dietary restraint. This would suggest that dieting is not a necessary precursor to the development of patterns of overeating among normal weight college females.
3. The full BED syndrome (i.e., binge eating with distress) was hypothesized to exist in this college sample; however, no more than 5% of the total sample was hypothesized to be distressed. The factors hypothesized to be most predictive of distress in this sample include body mass index, body dissatisfaction, and self-efficacy.
4. Both coping styles and anger were hypothesized to be related to overeating patterns. Specifically, avoidant coping was hypothesized to be more prominent among clinical binge eaters, as compared to "normals" and overeaters. In addition, binge eaters were hypothesized to experience significantly more anger but to be more inclined to suppress it rather than express anger.
5. It was hypothesized that a continuum model of eating patterns would be supported such that subjective and objective binge eaters, although not necessarily different from each other, would be easily distinguishable from normals and from overeaters on the basis on concomitant psychosocial indices.

### Method

#### **Recruitment**

Three hundred and ninety-one undergraduate college females were recruited as participants in this study. Participants received extra credit points toward their undergraduate psychology course for participation. Previous research with Virginia Tech students (Russ & Tate, 1996) suggests that participants ascertained via this recruitment method are willing to self-report behavior and attitudes about eating habits. Consistent with the previously stated goals of the present study, eligibility criteria included being a female college student of at least 18 years of age and no clinical signs of bulimia nervosa or anorexia nervosa, as well as a BMI index less than 27.3, to ensure a non-obese sample. The National Center for Health Statistics defines overweight as a BMI of 27.3 or greater among women, which corresponds to approximately 20% above desirable body weight in the 1983 Metropolitan Life Tables. All women who signed up to participate were included in the study. However, 15 individuals were dropped from analyses secondary to a BMI index  $> 27.3$ ; 15 women were excluded because they reported frequent bingeing and purging with self-induced vomiting; and 10 women were excluded for a BMI  $< 18$  and excessive dietary restraint consistent with anorexia nervosa. Three hundred and fifty-one participants were included in the final analyses. Every participant received verbal and written information regarding assessment and treatment centers for eating problems as well as other psychological disturbances.

### **Procedure**

Participants attended a group testing session in which all self-report instruments were completed. Participants provided written informed consent. Although participation was not anonymous, participants were assigned a unique study ID number on their consent form that was subsequently used on each questionnaire in place of their name or other identifying information. Participants completed the following questionnaires: the Questionnaire on Eating and Weight Patterns-Revised, the Student Adaptation to College Questionnaire, the Weight Efficacy Life-Style Questionnaire, the Center for Epidemiological Studies Depression Scale, the State-Trait Anxiety Inventory, the State-Trait Anger Expression Inventory, the COPE Questionnaire, the Emotional Eating Scale, and the Dutch Eating Behaviors Questionnaire - Restraint Scale, and a self-reported frequency of current eating patterns (all measures are referenced and described in the measures section).

Because several questionnaires were administered in one session, the testing sessions were highly structured to ensure each participant clearly understood the instructions for each measure and adequately completed each measure before proceeding to the next. Group sessions were limited to 20 participants per session. Questionnaires were administered to the entire group one at a time. Overhead transparencies were made of every questionnaire so that instructions and examples of how to complete each questionnaire were standardized. This procedure may have minimized any tendency to quickly complete the questionnaires without attending to the details of the items as well as minimized the possibility of any participant not fully understanding the instructional set. Most of the questionnaires were formatted and completed on opscan forms for ease of scoring and data entry. Although this necessitated the directions on some scales to be slightly modified to fit the opscan forms, the structure, order, and intent of the measures were unchanged. This self-report instrument battery required 75-90 minutes to complete.

### **Measures**

**1. *College Adjustment: Student Adaptation to College Questionnaire (SACQ)*.** The student adaptation to college questionnaire (SACQ; Baker & Siryk, 1989) is a 67-item, self-report questionnaire which was designed to assess aspects of college adjustment. Participants rate the items on a nine point scale ranging from “applies very closely to me” to “doesn’t apply to me at all.” Although this scale consists of 4 unique factors of adjustment in addition to an overall index of college adjustment, only the two most relevant scales of adjustment were used as indicators of college adjustment. Specifically, the Social Adjustment scale consists of 20 items relevant to the interpersonal societal demands inherent in college adjustment and the 15 item Personal-Emotional Adjustment subscale addresses the students psychological distress and physical well-being, including somatic complaints.

**2. *Negative Affect - Depression: Center for Epidemiological Studies Depression Scale*.** The Center for Epidemiological Studies Depression Scale (CES-D; Radloff, 1977) was originally developed for use in epidemiological studies to assess depressive symptomatology in the general population. This scale differs from other clinical instruments in that it assesses current level of depressive symptomatology with an emphasis on the affective component of depressed mood. It was designed for use in studies to assess the relationships between depression and other

variables across population subgroups. The scale consists of 20 items; participants rate to what extent they have experienced each symptom in the past week, with options ranging from “rarely/none of the time (less than 1 day)” to “most or all of the time (5 - 7 days).” The summary score on the CES-D was used as an index of depression.

**3. *Negative Affect - Anxiety: State-Trait Anxiety Inventory (STAI-Y)*.** The STAI (Spielberger, Gorsuch, & Lushene, 1970) was developed as a reliable yet relatively brief (20 items) self-report index of both state and trait anxiety. Participants report how they feel “right now, at this moment” on the state version of the STAI and self-rate how they “generally” feel on the trait version. Although individual completed both versions, only the trait anxiety factor was used. The STAI-Trait version has individuals rate the frequency of each of their anxiety symptoms on a four-point Likert scale ranging from 1 “almost never” to 4 “almost always.” The STAI-Y, a revised version of the STAI, was used because it was developed to be less contaminated with items of depression and anger than the original version of the STAI.

**4. *Anger: State-Trait Anger Expression Inventory (STAXI)*.** The STAXI was also developed by Spielberger (1988) to assess the experience, expression, and control of anger. The STAXI, a 44 item self-report index, emerged from the combination of the State-Trait Anger Scale and the Anger Expression Scale and consists of five well supported factors including state anger, trait anger, anger control, anger-in, and anger-out. The anger expression factor, which is a computation of the anger-in, anger-out, and anger control subscales, was used as an index of anger.

**5. *Weight and Shape Cognitions: Eating Disorders Examination -2 (EDI-2), Body Dissatisfaction Scale*.** The Body Dissatisfaction Scale of the EDI-2 (Garner, 1991) is a 9 item self-report scale in which the participant rates the extent to which they endorse each item on a six-point Likert scale ranging from “always” to “never.” Items on the Body Dissatisfaction subscale assess dissatisfaction with one’s overall shape and with specific body regions, including one’s stomach, hips, thighs, and buttocks.

**6. *Weight and Shape Cognitions - Body Image Scale*.** The Contour Drawing Rating Scale (Thompson & Gray, 1995) was used to assess body image disturbance. This scale asks participants to rate their perceived body size as well as their ideal body size using contour drawings and silhouettes of incremental sizes. The discrepancy between these two ratings is an

indication of body image dissatisfaction. With body image assessment, it has been shown that different instructional sets can lead to different response biases. For example, affective ratings (i.e., “how do you feel you look”) produce larger discrepancy ratings of body image dissatisfaction than cognitive appraisals (i.e., “how do you think you look”); this findings has been replicated with both eating disordered and non-eating disordered populations as well as with self-report and figural drawings (Thompson, 1996). Thus, a cognitive instructional protocol was used for this study.

**7. *Emotional Eating - Emotional Eating Scale (EES)*.** The Emotional Eating Scale (Arnou, Kenardy, & Agras, 1995) was developed to assess the relationship between specific negative emotional states and desire to eat. It is a self-report index consisting of 25 items in which the individual rates their urge to eat on a five-point scale ranging from “no desire at all” to “an overwhelming urge to eat” in response to each of the 25 emotions listed. Factor analysis of the scale revealed three primary factors, including the Anger/Frustration subscale, the Anxiety subscale, and the Depression subscale. Summary scores on each of these three factors were used as measured indices of emotional eating.

**8. *Self- Efficacy - Weight Efficacy Life-Style Questionnaire (WEL )*.** Because self-efficacy has been not been well researched in binge eating, there exists no psychometrically sound measure of self-efficacy with regard to binge eating. However, a reliable and valid self-efficacy expectancy scale from the weight management literature was adopted for use in this study. The Weight Efficacy Life-Style Questionnaire (WEL; Clark, Abrams, Niaura, Eaton, & Rossi, 1991) is a 20-item self-report measure which assesses the individual’s level of self-efficacy for resisting eating in five situations: Negative Emotions, Availability, Social Pressure, Physical Discomfort, and Positive Activities. For this study, the word “eating” was replaced with “binge eating.” The appropriateness of modifying this scale for use with binge eaters is further supported by empirical data which has documented these five situations as common precursors to binge episodes (Johnson et al., 1995). Participant’s rated their confidence about being able to successfully resist the desire to binge eat in each situation using a 10-point Likert scale ranging from 0, “not at all confident,” to 10, “very confident.” Summary scores on empirically derived factors were used as measured indicators of self-efficacy.

Although self-efficacy and outcome expectancies are conceptually distinct constructs, the process by which self-efficacy is measured often incorporates an implicit and sometimes explicit component of outcome expectancies. For the self-efficacy measure described above, outcome expectancies are implied. An urge to binge eat in response to a variety of emotions implies that the behavioral response of eating is in some way linked to the relief from that emotion, otherwise that emotion would not create a desire to binge. In fact, Bandura (1995) has suggested that the construct of self-efficacy does incorporate the ability to produce an outcome. Thus, while it is recognized that self-efficacy and outcome expectancies are distinct constructs, they are inextricably linked in most assessment instruments to date and both appear to be captured in the WEL.

**9. *Eating Patterns - Eating Disorders Examination -2 (EDI-2), Bulimia Scale.*** The Bulimia Scale of the EDI-2 (Garner, 1991) is a 7 item self-report index in which the participant rates the extent to which they endorse each item on a six-point Likert scale ranging from “always” to “never.” Items on the Bulimia subscale specifically assess the tendency to engage in binge eating and related behaviors consistent with bulimia nervosa. The summary score on this factor was used as an index of eating patterns.

**10. *Eating Patterns - Questionnaire on Eating and Weight Patterns - Revised (QEWP-R).*** The QEWP-R was developed by Spitzer and colleagues (1992) to diagnose binge eating disorder, and it remains the only diagnostic procedure specifically developed for identifying BED. The QEWP-R is a 28 item instrument which, despite its simplicity, appears sufficient to diagnose binge eating disorder (deZwaan et al., 1993). The QEWP-R was used to obtain demographic data, information on the frequency of binges, loss of control, other concomitant and diagnostic symptoms during binge episodes. The Questionnaire on Eating and Weight Patterns - Revised was used in conjunction with a measure created to specifically assess eating patterns within the past month (described below) to create a clinical index of eating patterns. This scaled index was used as an indicator of eating patterns. One item on the QEWP-R which assesses how often an individual is on a diet (i.e., intentionally restricting food intake for the purpose of weight loss) was used as an index of dietary restraint.

**11. *Eating Patterns - Eating Patterns Questionnaire.*** The QEWP-R assesses only the frequency of binge eating for the prior six months; however, other eating patterns, such as

subjective binge eating and overeating, were also of interest in this study. In addition, assessing current eating patterns was also of interest. Thus, a brief measure of eating patterns was developed to augment findings from the QEWP-R. Specifically, this measure attempted to distinguish between and assess frequency of “objective” and “subjective” binge episodes, as well as episodes of overeating (i.e., eating an unusually large amount of food but without feeling a loss of control) within the past month (see Appendix A). In this research, every attempt was made to accurately define an objective binge eating episode and give examples of objective binges, subjective binges, as well as episodes of overeating. The procedure for administering the self-report indices described above allowed for timely and frequent reminders of the definition of objective binge eating. This process may have increased the participant’s objectivity and accuracy in reporting binge eating. Based on this measure, each participant was assigned a rating for the category of overeating patterns reported, with higher ratings suggestive of more disordered eating patterns (see Table 2 for rating structure). This rating served as an indicator of the dependent measure, eating patterns.

**12. Coping - The COPE.** The COPE, a multidimensional coping inventory, was used to assess individuals coping styles and strategies (Carver, Scheir, & Weintraub, 1989). This instrument is a self-report index of how individuals are currently coping with stress. The COPE contains 60 items, each of which is rated on a four-point Likert scale ranging from 1, “I am not doing this at all” to 4, “I am doing this a lot.” Various coping styles are assessed, including avoidant coping processes such as mental and behavioral disengagement and denying, as well as active and supportive coping styles. Each of these scales are derived by a sum of items.

**13. Dietary Restraint - Dutch Eating Behavior Questionnaire-Restraint Scale (DEBQ-R).** The Dutch Eating Behavior Questionnaire is a 33 item instrument designed to assess three aspects of eating behavior: restrained eating; emotional eating; and external eating. Factor analytic techniques have been used to demonstrate the unique loading of items on these three scales (van Strien, Frijters, Bergers, & Defares, 1986). Only the restraint subscale, which consists of 10 items concerning deliberate, planned weight control efforts, was used in this study. Participant rate each item with respect to how often they engage in each particular restrained eating behavior, ranging from “never” to “very often.” The mean on these 10 items is calculated resulting in an average score ranging from 0 to 5. This scale was used to both

exclude highly restrained individuals who also exhibited extremely low BMIs from the total sample as well as an index of dietary restraint in the test of the alternative model.

**14. Body Mass Index.** Self-reported weight and height will be obtained from all participants on the QEWP-R to determine their body mass index (i.e., weight in kilograms divided by height in meters<sup>2</sup>).

**15. Demographics.** A brief demographics questionnaire was developed and administered to each participant for descriptive purposes. No specific hypotheses are made with respect to specific demographic factors. Although the QEWP-R contains some basic demographic items including age, gender, ethnic background, and education, some additional factors, such as parental education, were also assessed.

## Results

### **Missing Data**

Missing data points on any given scale were replaced with the mean value for the specific factor on which that particular item loaded. If more than 1 item on a 10 point scale, or 2 items on a 20 point scale was missing, mean substitutions were not made and the scale for that variable was considered missing. The lowest pairwise “n” from the correlational matrix was used to specify the LISREL sample size (n=350).

### **Classification of Eating Patterns**

Binge eaters were defined as individuals who reported at least once per week objective binge episodes without subsequent compensatory strategies, within the past month. Subjective binge eaters were defined as those women who reported eating episodes in which they did not consume large amount of food but felt a loss of control during the eating episode. These episodes had to occur at least once per week in the past month. Overeating was defined by eating an unusually large amount of food *without* a co-occurring sense of loss of control. Often, women reported eating episodes within at least two of these categories making it impossible to categorically assign women to each of these groups. Thus, a clinical rating scale was developed to capture the severity of reported eating pathology (See Table 2). This scale accounts for the presence of various eating patterns but does not account for frequency of episodes beyond twice per week. This rating scale was used as one of the primary dependent measures of eating behavior in the structural equation model.

## **Data-Analysis Procedures**

***Factor Analysis of Select Measures.*** The WEL and the Emotional Eating Scale have only been factor analyzed and validated using obese populations. In addition, the WEL was slightly modified to include the term “binge eating” in place of “eating” for this study. Thus, a factor analysis was conducted to determine if previously cited factors derived on these measures were consistent with the studied sample. The empirically derived factors were used in the structural equation when differences emerged.

***Preliminary Structural Equation Analysis.*** Using LISREL 8.B software (Joreskog & Sorbom, 1993), the preliminary model (Figure 1) was tested to determine the best measurement model for each hypothesized variable. Results and modification suggestions from this initial run were used to refine the original model into a final model. The process of using the data to help develop and modify a tentative model which was originally developed from theory and empirical data is well supported in the literature (Joreskog & Sorbom, 1993; Schumacker & Lomax, 1996).

Once the final model was specified, the reliability of each measure/factor was assessed via an index of internal consistency, Cronbach’s Alpha. Next, a correlational matrix of all measured variables was observed for possible multicollinearity and to determine whether minor adjustments were necessary to minimize correlations between indicators loading on different latent variables. No such adjustments were necessary.

***Analysis of Final Model.*** Latent variable structural analysis with LISREL 8.B software (Joreskog & Sorbom, 1993) was used to test the final model. Latent variable structural analysis enables a simultaneous test of the measurement model via factor analytic techniques and the latent structural model to estimate the effects associated with unmeasured latent variables. The factor analytic technique adjusts for the measurement error associated with the observed variables, the lack of correlation among indicators of the same latent variable, or the presence of correlated errors among indicators of a latent variable.

Standard path coefficients are calculated for each of the direct effects assumed in the model as well as for the indirect effects, which collectively estimate the total effects of each variable on overeating patterns. LISREL also calculates indices which describe how well the proposed model fits the data, such as the Chi-Square statistic and several Goodness of Fit

Indices (GFIs). If the p-value of the Chi-Square statistic is large (non-significant), one can conclude that the model fits the data; however, Chi-Square is also influenced by sample size such that reasonable large sample sizes will always result in a small p-value. Thus, the Goodness of Fit Indices can provide further information regarding how well the proposed model fits the data. The adjusted goodness of fit index (AGFI) examines both model fit and model parsimony by adjusting the standard goodness of index for the degrees of freedom in a model relative to the number of variables. All GFIs have a minimum value of 0 and a maximum value of 1.0; values greater than .90 suggest the model fits the data sufficiently. Other indices to assess model fit include the root mean square error of approximation (RMSEA) which is a measure of discrepancy per degrees of freedom, with values of .05 suggesting a close fit to the data and values up to .08 indicating a reasonable fit to the data (Browne & Cudeck, 1993, as cited in Joreskog & Sorbom, 1993). Finally, LISREL calculates how much of the variability in the in the outcome variable is explained with an  $R^2$  statistic, the coefficient of multiple determination.

***Model Comparison.*** Comparing competing models can often strengthen the conclusions made from SEM research, particularly when the comparison of an alternative model suggests the original model provides a better or more parsimonious fit to the data. The alternative model tested in this research was the model which included dietary restraint. The goodness of fit statistics and  $R^2$  for the model developed without dietary restraint were compared to this same model with dietary restraint included. In addition to the statistics discussed above, several other indices are used when comparing competing models to assess which model represents a better fit to the data. The Akaike Information Criterion (AIC) is used to compare models with differing numbers of latent variables; it provides an index of both model fit and model parsimony. The AIC is always positive, but smaller values indicate a more parsimonious model (Schumacker & Lomax, 1996). Two other criterion, which are highly related to AIC, can also be used for model comparison. These are the CAIC and the ECVI, both of which are functions of chi-square and the degrees of freedom. Again, smaller values indicate the more parsimonious model. The AIC and CAIC are both derived from statistical information theory whereas the ECVI is based on the discrepancy between the fitted covariance matrix in the analyzed sample and the expected

covariance matrix that would be obtained in another sample of the same size (Joreskog & Sorbom, 1993). However, all indices are interpreted similarly.

***Analysis of Anger and Coping.*** In order to test the preliminary hypotheses regarding anger and coping, analyses of variance were conducted, using Bonferroni comparisons. Bonferroni comparisons were chosen to reduce the observed significance level based on the number of mean comparisons being made, thereby reducing the probability of a Type I error.

***Distressed vs. Non-Distressed Binge Eaters.*** The first step in exploring differences and similarities among distressed and non-distressed binge eaters was to isolate the binge eaters from the non-binge eaters. Binge eaters were then grouped into two mutually exclusive groups of distressed or non-distressed. A logistic regression was conducted to explore the unique contribution of each hypothesized predictor to the explanation of distress, while controlling for the influence of each additional variable in the regression equation. Odds ratio calculations, with 95% confidence intervals, assessed the strength of the associations between factors and distress for the logistic regression analyses.

***Subjective vs. Objective Binges: The Continuum Model?*** The hypothesis of a continuum of eating patterns and related psychosocial factors was explored only descriptively, with graphical representation of level of concomitant psychological indices by subgroups of eating patterns.

### **Participants**

Among the 351 participants, there was a mean age of 19.29 (sd=1.23); 45.8% were freshman, 30.5% were sophomores, 14.2% were juniors and the remaining 9.4% were college seniors. The median maternal level of education was 14.73 years (sd=2.54) and the median paternal level of education was 15.70 years (sd=2.68). Mean body mass index was 21.84 (sd=2.7). Among the sample, 86.9% were Caucasian, 6.8% were Asian, 3.1% were African American, and 3.1% did not identify belonging to any of the above ethnic groups.

Previous epidemiological studies have suggested a prevalence of binge eaters in a sample of college females to be roughly 17%. Although it is unclear whether voluntary participation in a study pertaining to eating patterns over or under recruits individuals with eating problems, the percent of objective binge eaters in this sample was 21.36%. The prevalence of BED in a similar college population has been estimated to be 3.6%; however, in this sample 7.4% met full

diagnostic criteria for BED according to the QEWP-R (see Table 1). Surprisingly, these rates were above those hypothesized. Finally, body dissatisfaction has been reported to be fairly normative among samples of college women, which was also evident in this sample. The mean perceived body image on a 1 to 9 scale was 5.06 (sd=1.53), with 1 being an emaciated figure and 9 representing an obese figure. The ideal body image on this same scale was 3.66 (sd=.928); the average body image discrepancy (i.e., actual body image - ideal body image) was therefore 1.39 (sd=1.25). Moreover, the mean body image believed to be most attractive to college males was 3.46, which correlated .617 ( $p < .01$ ) with ideal body image.

### **Data Analysis Results**

*Factor Analysis of Select Measures.* An exploratory factor analysis of the Emotional Eating Scale, using principal component analysis with a varimax rotation, supported the 3 factor solution described earlier. Thus, the factors described previously (anxiety, anger/frustration, and depression) were used as indicators of emotional eating in the structural equation model.

For the WEL, all items were subjected to a principal component factor analysis with varimax rotation. Using Kaiser's stopping rule as the criterion (Bryant & Yarnold, 1995; i.e., only retaining eigenvectors with eigenvalues greater than 1.0), three factors emerged. The factor structure that emerged from this sample is presented in Table 3 with factor loadings. The first factor had loadings from 8 items; items on this factor appeared to capture many of the items on the original positive activities and availability scales for the WEL and was labeled 'free time.' The second factor had loadings from 6 items; the main items on this scale were the 'social pressure' items from the WEL and, therefore, that label was retained. The final factor also had 6 items loadings; items on this scale were both from the 'physical discomfort' scale and the 'negative emotions' scale of the WEL and was thus labeled 'physical or emotional discomfort.' Because a different factor structure emerged from prior validation of this measure with obese samples, the empirically derived factors from this sample were used in the structural model.

*Preliminary Structural Equation Analyses.* Results and suggested modifications from the initial run of the model suggested that anger, negative affect (depression and anxiety), and college adjustment were not operating as distinct variables. To further explore this, a factor analysis was conducted to assess the extent of overlap among the indicators of these variables. A confirmatory factor analysis also suggested that the measured indicators of these variables

were highly correlated. When conceptualized as a single variable of “global adjustment” the factor loadings for each of the measured indicators ranged from .88 to .65, thereby confirming the significant overlap.

Although depression, anxiety, anger, and college adjustment have each been researched independently in relation to eating patterns, there appeared to be substantial overlap in the construct being assessed with these variables, particularly within a sample of college females. This overlap may be a reflection of imprecise measurement of these variables or it may reflect a theoretical overlap among these constructs. In this research it was believed that a more global construct labeled “adjustment” adequately captured each of these domains into a potentially more meaningful variable. These modifications to the original model resulted in a final model of overeating patterns among normal weight college females, which is shown in Figure 2.

The measure/factor internal consistencies and inter-correlations among indicators for the same latent variables in the final model can be found in Tables 4 and 5, respectively. Cronbach alphas ranged from .74 to .94; there was evidence of sufficient reliability on all measures/factors. In addition, within latent variables, the indicator variables were strongly correlated.

***Analysis of Final Model.*** The measurement and structural model with standardized path coefficients is presented in Figure 2. This model depicts how many and which indicators (all described in measures section) loaded on the various latent variables. Because of the potential overlap between the weight and shape cognitions variable and the dependent variable, there was a specific attempt to avoid any behavioral indicators on the weight and shape variable so as to only capture disordered *cognitions*. Specifically, this variable was conceptualized as an index of disordered attitudes and thoughts about one’s body size and shape. In turn, the indicators on the dependent variable were selected to capture a relatively pure assessment of *behavioral* practices, rather than cognitions or attitudes related to eating patterns.

Using the modification indices provided by LISREL, it was determined that the model fit could be improved by allowing several of the error variances on indicators *within* latent variables to covary. Error variance of each indicator captures the residual variance of that factor (i.e., the variance that is not assigned to the latent variable). Specifically, the error variances on two of the self-efficacy indicators were allowed to correlate. These errors were from two

different factors of the same questionnaire which might explain why these errors are correlated (i.e., items loading on the two factors were from the same measurement scales). The error variances of trait anxiety and trait anger were also allowed to covary. Although these measures are distinct, they are formatted identically with the same instructional set and identical Likert scale for responding. Thus, these errors may also be correlated due to an artifact of measurement. Finally, the errors from the personal-emotional adjustment scale of the SACQ and trait anxiety, both on the adjustment variable, were allowed to correlate. These scales, although measured differently, tap similar constructs (anxiety); the recommendation to allow these errors to correlate from the LISREL output suggests there is some commonality in what is not being measured by each of these factors.

The goodness of fit statistics suggest the model provided a good fit to the data ( $X^2 = 142.43$ ,  $df = 77$ ,  $p < .05$ ),  $RMSEA = .048$ ,  $GFI = .95$ ;  $AGFI = .92$ ). In addition, 78% of the variability observed in eating patterns among normal weight college females was explained by the combination of latent variables included in this model. Table 6 presents the direct, indirect, and total effects of each variable in the model.

Adjustment had a significant direct effect on eating cognitions, emotional eating, self-efficacy, and overeating patterns. Weight and shape cognitions had a significant direct effect on emotional eating, self-efficacy, and overeating patterns. Emotional eating also had a significant direct effect on both self-efficacy and overeating patterns. Finally, self-efficacy had a significant direct effect on overeating patterns. Adjustment appeared to have the largest total effect on overeating patterns; however, the majority of its effect was indirect via the other latent variables within the model. Emotional eating had the largest direct effect on overeating patterns. Although this variable is slightly mediated by self-efficacy, its largest contribution to explaining overeating patterns appears to be a direct influence.

Results of this model posed an interesting question regarding the importance of emotional eating. Emotional eating, as defined in this research, was comprised of three factors: a tendency to respond by a desire to eat to (1) anxiety; (2) depression; and (3) anger and frustration. Post-hoc analyses of variance were used to explore whether differences existed across these factors by eating subgroup. The sample was divided into 4 mutually exclusive subgroups based on their responses on the QEWP-R and the self-report of eating patterns, (1)

'normals' (2) overeaters (3) subjective binge eaters (4) binge eaters. Participants reporting eating episodes in more than one category were assigned to the more severe category of eating. For example, an individual reporting both overeating and subjective binge episodes was assigned to the subjective binge category. An ANOVA with post-hoc Bonferroni comparisons revealed significant differences across subgroups (see Table 10 and Figure 4). Specifically, binge eaters were distinguishable from normals as well as from overeaters and subjective binge eaters on level of emotional eating across all three factors ( $p < .001$ ). Interestingly, an examination of the magnitude of the means suggested binge eaters reported the strongest desire to eat in response to anger/frustration, rather than anxiety and depression which have been the most targeted variables to date.

**Model Comparison.** The alternative model which included dietary restraint was tested as both a comparison to the final proposed model as well as to address the question of whether dietary restraint was a significant, direct contributor in the explanation of overeating patterns among a sample of normal weight college females. This model with standardized path coefficients is presented in Figure 3. Table 7 presents the direct, indirect, and total effects of each latent variable. In general, this model also provided a reasonably good fit with the data ( $X^2=208.45$ ,  $df=104$ ,  $p < .05$ ;  $RMSEA = .054$ ,  $GFI = .94$ ;  $AGFI = .91$ ) and 79% of the variability observed in overeating patterns was explained with this model. Table 8 presents a direct comparison of model fit and model comparison indices for the proposed final model and the model with dietary restraint included. An examination of the AIC, CAIC, and ECVI all confirm the proposed final model without dietary restraint provides a better, more parsimonious fit to the data. Moreover, dietary restraint had no significant direct effect on eating patterns suggesting it is not a critical variable in explaining overeating patterns among normal weight college females.

The question of whether dietary restraint is a contributor to the explanation of binge eating is often addressed by assessing, retrospectively, age of onset for dieting and binge eating. For comparison purposes with other samples, a similar question was asked in this study; the results are presented in Table 9 and suggest that in the majority of individuals who currently engage in some form of binge eating, dieting *did not* precede the onset of binge episodes. Specifically, only 15% of current binge eaters reported that dieting *preceded* the onset of binge

eating. Over 74% of current binge eaters reported the absence of dieting or dieting only secondary to the onset of binge eating, suggesting that dieting may not be a common pathway to patterns of overeating and binge eating.

***Analysis of Anger and Coping.*** Clearly most research to date has focused on the importance of depression as a precursor to binge eating; however much less attention has been devoted to the construct of anger. Anger can be expressed or inhibited. To the extent anger is inhibited or suppressed, but still perceived as an uncomfortable emotional state, it may be related to binge eating via the same mechanism depression and anxiety have been hypothesized to be related to binge eating. The first step, however, is to document that anger is related to binge eating. An ANOVA, with Bonferroni comparisons, was conducted using the subgroups described above and the STAXI scales, which assess the extent to which anger is experienced, expressed, suppressed, or controlled as continuous dependent variables. Table 11 displays the descriptive data as well as the summary results of this analysis. In general, the results suggest that binge eaters report significantly higher levels of anger overall (trait anger;  $F=4.72$ ,  $p < .05$ ) as well as more frequent attempts to suppress anger (anger in;  $F=6.57$ ,  $p < .05$ ) and control anger expression (anger control;  $F=3.098$ ,  $p < .05$ ) when compared to normal eaters; no differences were found across subgroups on the frequency of anger expression (anger out).

As hypothesized, the extent to which emotional eating can be conceptualized as means to cope with unpleasant emotions, it is reasonable to expect that these subgroups of eaters might evidence differences in their global coping styles as well. Another ANOVA with post-hoc Bonferroni comparisons was conducted using the same subgroups delineated above, with different factors of the COPE as dependent variables. Results indicate that individuals who binge eat report more avoidant coping styles, such as behavioral disengagement ( $F = 5.84$ ,  $p < .05$ ) and denial ( $F = 7.03$ ,  $p < .05$ ), compared to both normal eaters as well as overeaters. However, there were no significant difference on more positive coping styles, such as seeking support or active/planning coping (See Table 12).

***Distressed vs. Non-Distressed Binge Eaters.*** A logistic regression analysis, using a backwards conditional model, examined the hypothesized predictors of distress among binge eaters. Binge eaters were dichotomized into two groups based on whether they reported none or mild distress regarding binge episodes or moderate to severe levels of distress with respect to

their binge eating. Twenty-seven non-distressed binge eaters were identified and 49 distressed binge eaters were identified. Body image discrepancy (i.e., perceived current body image minus ideal body image) was the main significant predictor of distress among binge eaters ( $X^2 = 13.985$ ,  $p < .01$ ). Contrary to the hypothesis, body mass index and self-efficacy were not retained in the multivariate logistic regression equation as significant predictors. The odds ratio for body image discrepancy predicting distress among binge eaters was 1.44 (95% CI = 1.17 - 1.77), suggesting the odds of being distressed increase by a factor of 1.4 for each unit increase in body image discrepancy.

***Subjective vs. Objective Binges: The Continuum Model?*** Figures 5, 6, 7, and 8 display graphical presentations of the following psychological indices by level of eating patterns: college adjustment, anxiety, depression, and body dissatisfaction, respectively. These graphs converge to support the notion of a continuum of eating pathology. Although these data are only provided in a descriptive context, the stepped nature of the graphs is compelling to provide some confirmation that eating patterns and related psychological concomitants fall along a continuum and, therefore, should be methodologically studied and theoretically understood in this manner.

#### Discussion

This research attempted to bridge some of the existing empirical gaps in understanding eating patterns as well as extend the field with an examination of potential mechanisms. Specifically, this study assessed college females, a sample that reportedly identifies symptoms of BED but has been vastly understudied with respect to binge eating in the absence of bulimia or anorexia nervosa. Second, the sample was not obese which also extends the extant empirical literature. Third, individuals along a continuum of eating behavioral patterns (i.e., individuals without significant eating pathology, episodic overeaters, individuals who meet all the criteria for BED except significant distress related to binge eating, as well as individuals meeting the proposed DSM-IV criteria for BED) were all included. Finally, this study examined multiple factors which are related to binge eating as well as hypothesized mechanisms which may exist among these variables to help explain overeating behavior, including binge eating. The majority of research to date has attempted to identify the factors potentially related to eating patterns but has not assessed the variety of these factors within a given sample and no study to date has explored potential mechanisms (i.e., interrelationships) among these factors. Finally, the use of

structural equation modeling in this study allowed for an exploration of the effects of each independent latent variable on overeating patterns while controlling for the effects of all other variables specified in the model.

***Final Model of Overeating Patterns Among Normal Weight College Females.***

Following the respecification of adjustment as one global construct, rather than three independent variables, and a few minor adjustments for correlated errors, the final measurement and structural model provided an exceptional fit with the data. Moreover, the final model explained a large amount (78%) of the observed variance in eating patterns. Although the chi-square statistic was significant, this was to be expected given the large sample size. The goodness of fit statistics and RMSEA all met the specified criterion to suggest a good model fit ( $>.90$  and  $<.05$ , respectively). Increasing model parsimony or eliminating some of the less influential paths might improve the goodness of fit. However, because there were no paths which were empirically and theoretically indicated for removal in the model, improvements in model fit may occur by strengthening the measurement model with more reliable indicators and decreasing the errors in measurement. Specifically, refining the measurement of the adjustment and self-efficacy variables to eliminate the need for correlated errors would likely improve both model fit and model parsimony. Because this model was developed and refined using the obtained data, it must be confirmed using an independent sample of normal weight college females. Despite this limitation, several interesting findings emerged from the empirical test of the proposed model. The importance of each the variables within the model will be discussed in turn.

***Adjustment.*** Adjustment, as defined by social adaptation to college as well as the absence of symptoms of depression, anxiety, and anger, appears to be the most important factor in explaining overeating patterns. This variable had the largest total influence on overeating patterns. Findings from this model, which are consistent with prior research, suggest individuals who are poorly adjusted to college and experience symptoms of depression, anxiety, or anger are more likely to evidence disordered eating patterns. Of particular interest from the results of this model, which has not been shown in previous research, is that level of adjustment is critical not only because of its direct effect on eating patterns, but also due to its significant indirect effects through weight and shape cognitions, emotional eating, and self-efficacy. This is not to say that

all individuals with symptoms of poor adjustment will develop disordered or diagnosable eating problems. However, when poor adjustment affects weight and shape concerns, increased emotional eating, and low self-efficacy, such individuals are at greater risk for exhibiting problematic eating. Level of adjustment is undoubtedly an elusive construct and one that is difficult to target because many of these symptoms are not uncommon among females trying to adopt to college lifestyle. Most likely, poor adjustment as it is defined in this model is a fairly global risk factor for the development of other types of problematic behaviors, such as excessive alcohol consumption or poor academic performance. However, its importance as a *specific* contributor to eating patterns can not be overlooked when developing prevention programs as well as treatment. In fact, this variable should be considered of primary importance to target when developing prevention and treatment programs. This model goes beyond existing research to begin to provide some explanation *how* adjustment exerts its influence on overeating patterns. Although this model must be confirmed and may require additional modification, adjustment in this sample appears to be the single most important construct in understanding the phenomenon of overeating patterns among a sample of normal weight college females.

As noted previously, little attention has been devoted to understanding how the construct of anger may be related to various eating patterns. There was a preliminary attempt to explore this construct among this sample of women. Consistent with the hypothesis, individuals who report binge eating episodes also reported experiencing significantly more anger, but inhibiting the expression of this anger and making more frequent attempts to control anger expression. An inability to express anger may result in more persistent or more frequent uncomfortable emotional states that are perceived as undesirable. In turn, subsequent attempts to relieve oneself of this negative emotional state by binge eating may occur. It is also plausible that individuals who currently experience binge episodes are frustrated with this eating pattern and, thus, more readily experience feelings of anger. However, they may fail to express these feelings because the anger they experience is actually anger with their repetitive binge behavior, rather than anger towards others.

***Weight and Shape Cognitions.*** Weight and shape concerns contribute directly to emotional eating as well as directly and indirectly to self-efficacy through emotional eating. Finally, weight and shape concerns exert a significant direct effect on eating patterns. Although

weight and shape concerns are relatively normative among college females, poor adjustment is believed to intensify these cognitions and create a stronger belief that weight and shape are of primary importance. In addition, to the extent that one experiences negative affect and weight and shape concerns, the more often they will encounter situations or emotions which may trigger a binge eating response and the less efficacious they may feel to resist the desire to binge eat. Body image dissatisfaction is evident even among normal weight females and often remains prominent even when disordered eating patterns are successfully treated. If body dissatisfaction occurs in isolation, these cognitions may not be problematic. When these cognitions are intensified by poor adjustment, however, an individual may begin to see “acceptable” weight and shape as primary pathways to emotional and social adjustment. This perception may then contribute to the development or exacerbation of overeating patterns, both directly and via emotional eating and decreased self-efficacy.

***Emotional Eating.*** Emotional eating is negatively related to self-efficacy, such that higher levels of emotional eating contribute to lower self-efficacy. As hypothesized, emotional eating is also strongly related to eating patterns, directly as well as indirectly via self-efficacy. A desire to binge eating in response to uncomfortable emotional states (i.e., emotional eating) is likely a learned phenomenon which is reinforced by the temporary alleviation of the negative emotional state. In this sample, the desire to eat in response to anger, anxiety, and depression was significantly higher among binge eaters as compared with other groups, suggesting that binge eaters may be more likely to connect eating with the alleviation of the negative emotional state. In addition, anger and frustration produced higher levels of emotional eating than either anxiety or depression. Consistent with previously discussed findings on anger, this provides additional evidence for the importance of future research targeted towards this variable.

Avoidant coping strategies were also significantly higher among binge eaters suggesting that binge eating may be used as one form of avoiding uncomfortable emotional states and attempting to quickly replace these emotions. Emotional eating is inconsistent with having self-efficacy for resisting the desire to binge eat, as is evident from the strong negative effect of emotional eating on self-efficacy. However, it is possible for the *desire* to binge eat in response to negative emotional states to exist but *not occur* if coupled with a high level of self-control and

confidence in one's ability to resist binge eating. Thus, increasing self-efficacy in spite of emotional eating could be one avenue for prevention and treatment programs.

*Self-Efficacy.* The significant, negative direct effect of self-efficacy on eating patterns (i.e., higher self-efficacy corresponds with less problematic eating patterns) would suggest this to be a viable treatment avenue. However, unlike hypothesized, this research would also suggest that self-efficacy is not the strongest direct predictor of eating patterns. Targeting the emotional eating and adjustment components directly may be more fruitful, given the strong direct and total effects of these variables on eating patterns. In addition, these variables serve to decrease self-efficacy. Thus, improving adjustment and decreasing emotional eating will, in turn, increase self-efficacy for resisting urges to binge eat. As previously suggested, targeting the tendency to respond to emotional states with a maladaptive coping mechanism (i.e., overeating) would suggest the need to introduce alternative coping mechanisms. Such coping mechanisms should be incompatible with eating when faced with a discomforting emotional state. Many treatment programs for binge eating target self-efficacy which is undoubtedly an important factor to consider. However, the importance of emotional eating as it relates to self-efficacy and overeating patterns should also be recognized and directly targeted in treatment. This will likely have a direct impact on improving eating patterns as well as increase self-efficacy.

In sum, the model supports the notion that negative affect is strongly related to eating patterns and that eating is often perceived as stress-reducing, soothing, and a means to regulate affect (Smolak & Levine, 1996). Thus, overeating and binge eating, the behavioral precursors to BN, BED, and obesity, which may be tried in response to negative emotions or stressful events, is experienced as reinforcing because it alleviates dysphoria or allows an escape from tension, and is therefore used again. An individual who is unable to negotiate alternative coping mechanisms and support or has little self-efficacy for not binge eating may continue this maladaptive behavior in the presence of continued negative affect (i.e., poor adjustment). This pattern, if not used with a compensatory strategy, will eventually lead to excessive weight gain and, therefore, elevated risk for numerous diseases, including coronary heart disease (Willett et al., 1995), adult-onset diabetes, stroke, hypertension, and hypercholesteremia (Willett & Manson, 1995).

***Model Comparison - The Role of Dietary Restraint.*** The test of the model with dietary restraint also provided a reasonable fit to the data with GFIs above .90 and a RMSEA of .054. However, there was no support for the direct relationship of dietary restriction on overeating patterns. In this model, the strongest influence on dietary restraint was level of weight and shape dissatisfaction; adjustment did not influence dietary restraint. Interestingly, dietary restraint did not significantly contribute to increased self-efficacy for resisting the urge to binge eat. Because dietary restraint does not add to the explanation of overeating patterns among this sample of women and appears to decrease the parsimony of the model, the model which excludes this variable appears to be the better model.

Despite findings that support the importance of dietary restraint among bulimic individuals, there is significant data which challenges the generalizability of this phenomenon across all types of eating patterns. For example, epidemiological data on binge eating disorder would indirectly suggest that dieting is not a necessarily factor. If dieting were universal in its relationship and causal link to the development of binge eating disorder, the equivalent rates of BED among ethnic groups would be difficult to resolve. Dieting, no matter how it is defined, appears to be more prevalent among Caucasian women, as compared to African-American women (Wilson, 1995b); however, the prevalence rate of binge eating disorder are nearly equivalence among these groups (Spitzer et al., 1992; 1993). Dieting also occurs much more frequently among women; however, binge eating disorder is equally prevalent among males and females, although females are more likely to present for treatment. Moreover, although two prospective studies have linked dieting to the development of bulimia (Patton et al., 1990), dieting has not been found as a consistent risk factor for the development of binge eating disorder. In fact, most individuals who meet current criteria for binge eating disorder often report the onset of binge eating and associated symptomatology as preceding their first attempt to diet (Spitzer et al., 1992; 1993; Spurrell, Wilfley, Tanofsky, & Brownell, 1997). Attempts to diet typically do not occur until after a regular pattern of binge eating has been established and weight gain begins to occur (Wilson, Nonas, & Rosenblum, 1993).

Treatment studies among binge eating disordered individuals suggest further evidence for a differential role of dietary restraint. For example, among successfully treated binge eating disordered individuals, dietary restraint increases, while hunger and disinhibition remain

virtually unchanged (Yanovski & Sebring, 1994). Moreover, increased dietary restraint among obese binge eaters following treatment did not worsen their severity of binge eating and, among non binge eating disordered individuals, increased dietary restraint did not increase the likelihood of future binge episodes (Yanovski & Sebring, 1994). Despite elevated indices of body dissatisfaction (Raymond et al., 1995), indices of cognitive restraint and drive for thinness, such as that measured by the Three Factor Eating Questionnaire (Stunkard, 1985), is lower among obese binge eating disordered individuals when compared to groups of non-binge eating disordered obese individuals, whereas hunger and disinhibition scales are higher (Lowe & Caputo, 1991; Marcus et al., 1988; Williamson et al., 1992; Yanovski & Sebring, 1994). Thus, perhaps dieting serves different functions in the different eating disorders. In bulimia, dieting may indeed be a necessary precipitating factor; however, dieting among binge eaters may be adopted in an attempt to prevent weight gain from the already occurring binge eating episodes. The retrospective data in this study may further supported the hypothesis that dieting is not a necessary causal factor in the development of various binge eating patterns as only 15% of current binge eaters reported that dieting preceded the onset of binge eating in this sample. Thus, despite early evidence for the possible role of dietary restraint in the etiology of binge eating, current evidence and theory would support the exclusion of dietary restraint in a explanatory model of overeating and binge eating patterns, among a non-eating disordered sample.

***Distressed vs. Non-Distressed Binge Eaters.*** The exploration of factors associated with significant distress among binge eaters was an attempt to provide some insight into possible factors that may protect one from developing the psychological sequela from binge eating. Contrary to the hypotheses that body mass index and self-efficacy would be related to level of distress about binge eating, distress was solely predicted by level of body image dissatisfaction. Unfortunately, body image dissatisfaction is both highly common among college females and resistant to intervention. With this in mind, the ultimate goal may not be to prevent binge eaters from becoming distressed, but rather prevent the binge eating behavior altogether.

***Subjective vs. Objective Binges: The Continuum Model?*** Finally, although statistical analyses were not conducted, this data set supported the continuum model of eating patterns as eating is related to psychosocial variables. On each domain assessed, including depression,

anxiety, body image dissatisfaction, and college adjustment, a gradual increase in severity of symptoms corresponded with increased severity of eating patterns reported. This data provides some confirmatory evidence of previously discussed findings that while individuals with BED are clearly distinct from “normals” on these psychosocial variables, groups of subjective and objective binge eaters do not significantly differ from one another on many concomitant indicators of eating pathology (Niego et al., 1997). This data calls into question the importance of the amount of food consumed criterion of the current definition of binge eating.

### **Implications, Limitations, and Future Directions**

The most encouraging finding from this model is the large amount of observed variance in overeating patterns explained by the model which included largely mutable aspects of problematic eating patterns. Although it may be instructional to know, for example that familial factors or historical factors are related to various eating patterns, these are not mutable with treatment or prevention programs. In contrast, the factors included and tested in the model are largely modifiable with proper motivation, intervention, and practice.

Going away to college and becoming integrated into the collegiate lifestyle may be a risk factor for the development or exacerbation of negative affect, such as depression, anxiety, and anger. This data would suggest that attempts to decrease poor adjustment to college would likely have an impact on eating patterns. Although it may seem apparent that orientation programs for college females should address these issues and their potential relationship to the development or exacerbation of problematic eating patterns, few empirically tested prevention programs have been developed and most of those have not been implemented with college students. (Mann, et al., 1997). Moreover, the information-only approach appears to be the predominate model of prevention programs with little, if any, attention allocated to skill building. The assumption is that increased knowledge will result in attitudinal change and subsequently, behavior change (or prevention). One recent article provided evidence that an information-based approach to primary and secondary prevention of eating disordered attitudes and behaviors was not successful (Mann et al., 1997). In fact, there was some evidence in the data suggesting the intervention may have temporarily increased disordered eating cognitions and behaviors, rather than prevent them (Mann et al., 1997). Thus, future research should

address how targeting the factors identified in this model can influence change both from a treatment perspective as well as from a prevention standpoint.

Programs could focus on developing alternative coping strategies which are incompatible with eating in response to negative emotions. In addition, programs could address how binge eating does not truly alleviate negative emotions, as several research studies suggest that guilt and frustration often arise following a binge episode (Grilo & Shiffman, 1994). Exposure to negative emotions with the prevention of binge eating responses may also serve to increase self-efficacy for avoiding binges, even if the desire to eat remains. Although weight and shape concerns are an important contributor, both directly and indirectly, to eating patterns, it may be less plausible and less effective to focus on these cognitions which are highly normative and may be largely influenced by perceptions of the body image believed to be most attractive to college males. The strong correlation (.617) noted in this sample among ideal body image and the body image believed to be most attractive to college males provides some support for this hypothesis. Moreover, these perceptions by college females may actually be highly accurate. A study with college males and females explored this concept by having college males rate the body image perceived as most attractive. Although there were some ethnic differences, in general, college males found smaller body shapes more attractive and acceptable (Greenberg & LaPorte, 1996). Thus, interventions which incorporate both education and skills, but place less emphasis on weight and shape concerns with more emphasis on adjustment, emotional eating, self-efficacy, and coping skills may be more successful. In addition, programs could emphasize the importance of seeking treatment for depression, anxiety, and excessive anger, as alleviation of these symptoms may also have a direct and indirect effect on eating patterns. Clearly, empirical evaluation of such programs with a longitudinal sample would be an ideal way to address these questions. Assessing college females, with a wide range of eating patterns, after they have been accepted to a university but prior to arriving on campus with subsequent follow-ups throughout their college careers would be ideal.

Although this research attempted to bridge some of the existing gaps in the empirical literature, there exists a clear limitation when attempting to discern causal relationships among variables with cross-sectional data. Structural equation modeling cannot prove the proposed model, it can only determine whether the obtained data provides a good fit to the specified

model. Experimental and longitudinal studies, although costly, would undoubtedly be the most informative research with respect to specifying causal models of eating patterns. Furthermore, although this model provides some interesting hypotheses of treatment and prevention targets, such as adjustment emotional eating, these must also be empirically evaluated. This research relied solely on self-report data, which has obvious limitations from a measurement perspective. Future research could perhaps include daily food diaries to assess eating patterns, rather than rely on retrospective accounts of eating patterns over the past month. Finally, this model must be examined on an independent sample of normal weight college females.

Although the proposed model explained a large amount of the observed variance in overeating patterns among normal weight college females, the model is not intended to be a final representation of important influences on eating patterns. Rather, it is viewed as a good working model from which additional research can further clarify, refine, and adjust the interrelationships of the variables. In addition, identifying other variables which may further contribute to the explanation and understanding of eating along the continuum is warranted. In particular, further research is necessary on specifying which factors may be protective from developing disordered eating practices. Currently, very little is known about potential protective factors. It has been demonstrated that non-disordered eaters score significantly lower on indices of pathology; however, the more positive factors which may discriminate normal eaters from disordered eaters are virtually unknown. For example, in this sample, although differences emerged across groups of eaters on avoidant coping, there were no differences on more adaptive means of coping such as active coping or seeking social support. Thus, further research must begin to explore which variables are related to the development and maintenance of normal eating patterns over time. It may be these factors that are more important in developing prevention programs for adolescent females. For example, rather than programs focusing on preventing the development of body image dissatisfaction, programs could ultimately be developed which try to promote or maximize protective factors. Until the field has reached this point, however, it is imperative to continue developing and implementing treatments and prevention programs targeting *mutable* factors which have been empirically supported to be related to problematic eating patterns as well as strive for more longitudinal research programs which explore precipitating, maintenance, and protective factors.

Table 1

Distribution of Eating Patterns Among Sample with Participants Categorized into Five Mutually Exclusive Groups

<b>Category</b>	<b>n</b>	<b>%</b>	<b>BMI</b>
“Normals”	121	34.5	21.07
Overeaters	99	28.2%	21.75
Subjective Binge Eaters	59	16.8%	22.15
Objective Binge Eaters	46	13.10%	22.59
Full BED Criteria	26	7.4%	23.82
<b>Total</b>	<b>351</b>		<b>21.84</b>

Table 2  
Rating of Eating Patterns

<b>RATING</b>	<b>N</b>	<b>EATING PATTERN(S)</b>
0	121	Normals: no overeating, no subjective binges, no objective binges
1	64	Overeating episodes 1/week
2	35	Overeating episodes > 1/week
3	13	Subjective binge episodes 1/week
4	15	Subjective binge episodes > 1/week
5	31	Overeating episodes and Subjective binge episodes
6	5	Objective binge episodes 1/week
7	3	Objective binge episodes 1/week and Subjective binge episodes
8	11	Objective binge episodes 1/week and Overeating episodes
9	12	Objective binge episodes 1/week and Subjective binge episodes and overeating episodes
10	1	Objective binge episodes > 1/week
11	5	Objective binge episodes > 1/week and Subjective binge episodes
12	5	Objective binge episodes > 1/week and Overeating episodes
13	4	Objective binge episodes > 1/week and Subjective binge episodes and Overeating episodes
14	26	Meets BED criteria

Table 3

Factor Analysis of Self-Efficacy Scale: Items and Factor Loadings

FACTOR AND ITEMS	FACTOR LOADINGS
<i>Free Time</i>	
I can control my binge eating on the weekends	.71
I can resist binge eating when I am watching TV	.83
I can resist binge eating when I am depressed or down	.75
I can resist binge eating when there are many different kinds of foods available	.66
I can resist eating when I am reading	.50
I can resist binge eating just before going to bed	.59
I can resist binge eating when I have experienced failure	.65
I can resist binge eating even when high-calorie foods are available	.57
<i>Social Pressure</i>	
I can resist binge eating even when I have to say 'no' to others	.51
I can resist binge eating even when I feel it's impolite to refuse a second helping	.70
I can resist binge eating even when I am at a party	.71
I can resist binge eating even when others are pressuring me to eat	.74
I can resist binge eating even when I think others will be upset if I don't eat	.76
I can resist binge eating when I am happy	.44
<i>Physical and Emotional Discomfort</i>	
I can resist binge eating when I am anxious (nervous)	.63
I can resist binge eating even when I feel physically run down	.47
I can resist binge eating even when I have a headache	.79
I can resist binge eating when I am angry (irritable)	.62
I can resist binge eating when I am in pain	.79
I can resist binge eating even when I feel uncomfortable	.59

Table 4

Reliability of Measures via Internal Consistency Estimates - Cronbach's Alpha

<b>SCALE</b>	<b># ITEMS</b>	<b>ALPHA</b>
<i>Adjustment</i>		
SACQ- Personal Emotional Adjustment	15	.83
SACQ- Social Adjustment	20	.88
Center for Epidemiological Studies Depression Scale	20	.74
Trait Anxiety (STAI-Y)	20	.93
<i>Emotional Eating</i>		
Emotional Eating- Depression Scale	5	.77
Emotional Eating - Anxiety Scale	9	.82
Emotional Eating – Anger/Frustration Scale	11	.91
<i>Self-Efficacy</i>		
Self-Efficacy – Social Pressure Scale	6	.84
Self-Efficacy – Physical and Emotional Discomfort Scale	6	.84
Self-Efficacy – Free Time Scale	8	.91
<i>Dietary Restraint</i>		
DEBQ	10	.94

Table 5  
Interrcorrelations Among Indicators of Latent Variables

*Adjustment*

	<i>CES-D</i>	<i>Anger Expression</i>	<i>Personal-Emotional Adjustment</i>	<i>Social Adjustment</i>	<i>Anxiety</i>
CES-D	1.00				
Anger Expression	.337	1.00			
Personal-Emotional Adjustment	-.601	-.438	1.00		
Social Adjustment	-.430	-.287	.533	1.00	
Anxiety	.560	.551	-.701	-.601	1.00

*Weight and Shape Concerns*

	<i>Body Dissatisfaction</i>	<i>Body Image Discrepancy</i>
Body Dissatisfaction	1.00	
Body Image Discrepancy	.687	1.00

*Emotional Eating*

	<i>EE-Depress</i>	<i>EE-Anger Frustration</i>	<i>EE-Anxiety</i>
EE-Depress	1.00		
EE-Anger Frustration	.694	1.00	
EE-Anxiety	.647	.786	1.00

Table 5 (continued)

*Self-Efficacy*

	<i>SE - Free Time</i>	<i>SE- Social Pressure</i>	<i>SE - Physical and Emotional Discomfort</i>
SE - Free Time	1.00		
SE - Social Pressure	.728	1.00	
SE - Physical and Emotional Discomfort	.705	.635	1.00

*Eating Patterns*

	<i>EDI-2: Bulimia</i>	<i>Eating Patterns Rating</i>
EDI-2	1.00	
Eating Patterns Rating	.511	1.00

*Dietary Restraint*

	<i>DEBQ-R</i>	<i>Time on Diet</i>
DEBQ-R	1.00	
Time on Diet	.694	1.00

Table 6

Direct, Indirect, and Total Effects of Final Model of Overeating Patterns Among Normal Weight College Females

<u>VARIABLE</u>	<u>EFFECT ON</u>	<u>INDIRECT</u>	<u>DIRECT</u>	<u>TOTAL</u>
<b>Adjustment</b>	Eating Cognitions	--	.38***	.38***
	Emotional Eating	.11***	.22***	.33***
	Self-Efficacy	-.23***	-.21***	-.44***
	<i>Eating Patterns</i>	<i>.34***</i>	<i>.24***</i>	<i>.58***</i>
<b>Eating Cognitions</b>	Emotional Eating	--	.28***	.28***
	Self-Efficacy	-.14***	-.18***	-.32***
	<i>Eating Patterns</i>	<i>.18***</i>	<i>.29***</i>	<i>.48***</i>
<b>Emotional Eating</b>	Self-Efficacy	--	-.49***	-.49***
	<i>Eating Patterns</i>	<i>.11***</i>	<i>.41***</i>	<i>.52***</i>
<b>Self-Efficacy</b>	<i>Eating Patterns</i>	--	-.22**	-.22**

\*\* significant at  $p < .01$

\*\*\* significant at  $p < .001$

Table 7

Direct, Indirect, and Total Effects of Final Model of Overeating Patterns Among Normal Weight College Females With Dietary Restraint

<u>VARIABLE</u>	<u>EFFECT ON</u>	<u>INDIRECT</u>	<u>DIRECT</u>	<u>TOTAL</u>
<b>Adjustment</b>	Eating Cognitions	--	.38***	.38***
	Dietary Restraint	.31***	-.05	.25***
	Emotional Eating	.11***	.24***	.35***
	Self-Efficacy	-.25***	-.21***	-.45***
	<i>Eating Patterns</i>	<i>.35***</i>	<i>.25***</i>	<i>.60***</i>
<b>Eating Cognitions</b>	Emotional Eating	--	.30***	.30***
	Dietary Restraint		.81***	.81***
	Self-Efficacy	-.02	-.31***	-.32***
	<i>Eating Patterns</i>	<i>.08</i>	<i>.40***</i>	<i>.48***</i>
<b>Dietary Restraint</b>	Self-Efficacy	--	.16	.16
	<i>Eating Patterns</i>	<i>-.03</i>	<i>-.13</i>	<i>-.16</i>
<b>Emotional Eating</b>	Self-Efficacy	--	-.48***	-.48***
	<i>Eating Patterns</i>	<i>.09**</i>	<i>.41***</i>	<i>.50***</i>
<b>Self-Efficacy</b>	<i>Eating Patterns</i>	--	<i>-.20**</i>	<i>-.20**</i>

\*\* significant at  $p < .01$

\*\*\* significant at  $p < .001$

Table 8

Model Fit and Model Comparison Indices for the Proposed Model With and Without Dietary Restraint

<b>Comparative Index</b>	<b>Final Model Without Dietary Restraint</b>	<b>Model With Dietary Restraint</b>
<b>Chi-Square</b>	142.43 (df=77) *	208.45 (df=104)
<b>RMSEA</b>	.048 *	.054
<b>GFI</b>	.95 *	.94
<b>AGFI</b>	.92 *	.91
<b>AIC</b>	228.43 *	306.45
<b>CAIC</b>	437.35 *	544.63
<b>ECVI</b>	0.65 *	0.88

\* Indicates which model is better on each index

Table 9

Onset of Binge Eating Versus Dieting: Does Dieting Always Precede Binge Eating?

<b>CATEGORY</b>	<b>NUMBER</b>
Binge Eating Preceded Dieting	28
Only Binge Eating - No Dieting	28
Dieting Preceded Binge Eating	10
Only Dieting - No Binge Eating	81
Co-Occurrence of Dieting and Binge Eating	9

Table 10

Descriptive Data and Analysis of Variance: Level of Emotional Eating by Eating Category

	<b>M</b>	<b>sd</b>	<b>df</b>	<b>F</b>	<b>p</b>
<b>Anger/Frustration</b>			342	20.252	< .001
Normals	17.60	6.48			
Overeaters	19.95	7.15			
Subjective Binge Eaters	22.04	7.47			
Binge Eaters	25.79	8.65			
<b>Anxiety</b>			342	17.667	<.001
Normals	14.52	4.68			
Overeaters	16.10	5.12			
Subjective Binge Eaters	17.34	5.81			
Binge Eaters	20.33	6.99			
<b>Depression</b>			342	24.004	< .001
Normals	10.51	3.38			
Overeaters	12.19	3.64			
Subjective Binge Eaters	12.94	3.97			
Binge Eaters	15.00	3.87			

Table 11

Descriptive Data and Analyses of Variance on Anger Scales for STAXI by Eating Category

	<b>M</b>	<b>sd</b>	<b>df</b>	<b>F</b>	<b>p</b>
<b>Anger In</b>			341	6.570	< .001
Normals	16.33	4.09			
Overeaters	18.08	4.79			
Subjective Binge Eaters	17.83	3.95			
Binge Eaters	19.12	4.85			
<b>Anger Out</b>			341	1.29	ns
Normals	16.21	4.64			
Overeaters	16.67	4.88			
Subjective Binge Eaters	15.13	3.89			
Binge Eaters	16.59	4.88			
<b>Anger Control</b>			341	3.098	< .05
Normals	23.78	5.19			
Overeaters	23.42	5.14			
Subjective Binge Eaters	23.96	4.43			
Binge Eaters	21.68	5.42			
<b>Trait Anger</b>			341	4.723	< .01
Normals	17.87	5.26			
Overeaters	18.72	5.68			
Subjective Binge Eaters	18.57	5.02			
Binge Eaters	20.87	5.89			

Table 12

## Descriptive Data and Analyses of Variance on Coping Scales by Eating Category

	<b>M</b>	<b>sd</b>	<b>df</b>	<b>F</b>	<b>p</b>
<b>Behavioral Disengagement</b>			341	5.837	<.001
Normals	6.39	1.93			
Overeaters	6.31	2.16			
Subjective Binge Eaters	6.83	2.46			
Binge Eaters	7.60	2.60			
<b>Denial</b>			341	7.030	<.001
Normals	5.47	1.70			
Overeaters	5.65	2.05			
Subjective Binge Eaters	6.09	2.30			
Binge Eaters	6.79	2.41			
<b>Act/Planning Coping</b>			341	.823	ns
Normals	23.69	4.44			
Overeaters	23.10	3.97			
Subjective Binge Eaters	23.10	3.60			
Binge Eaters	22.79	4.25			
<b>Seeking Support</b>			341	.999	ns
Normals	36.10	7.36			
Overeaters	34.66	7.75			
Subjective Binge Eaters	35.21	7.74			
Binge Eaters	36.33	7.02			

## Figure Caption

Figure 1. Preliminary model of overeating patterns among normal weight college females.

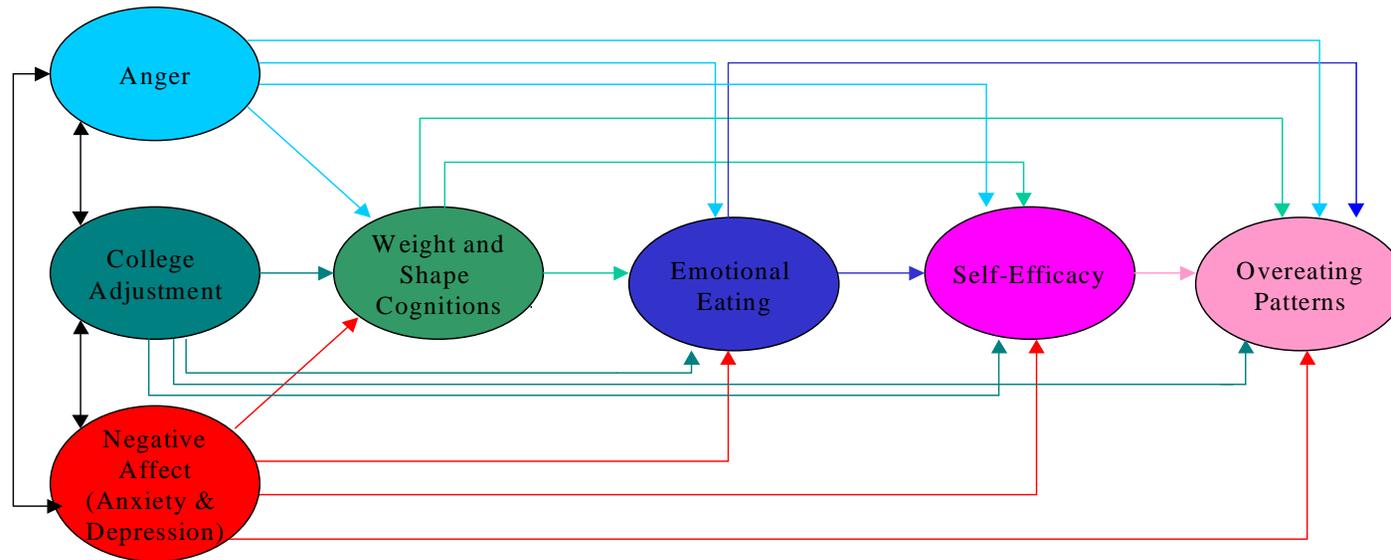
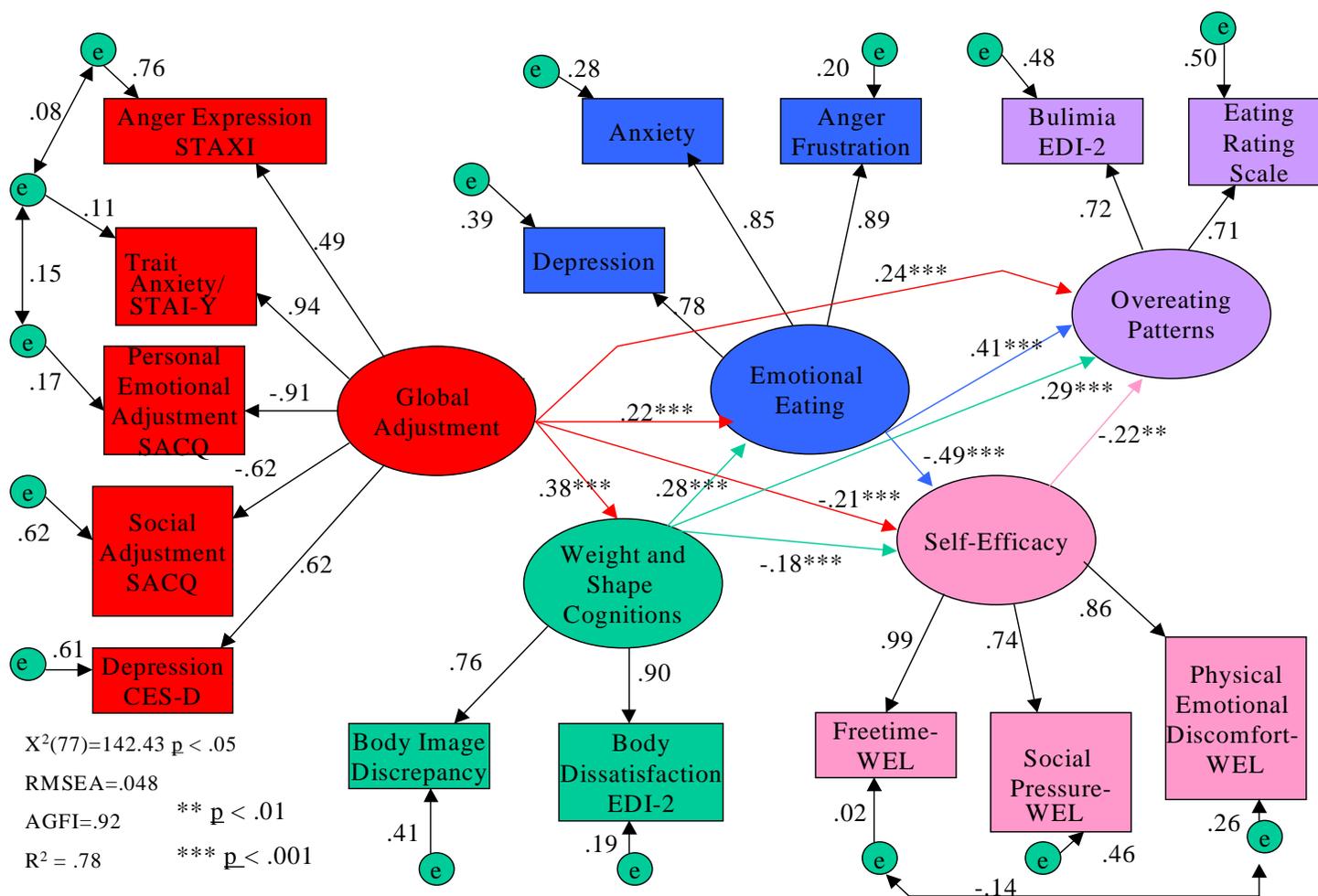
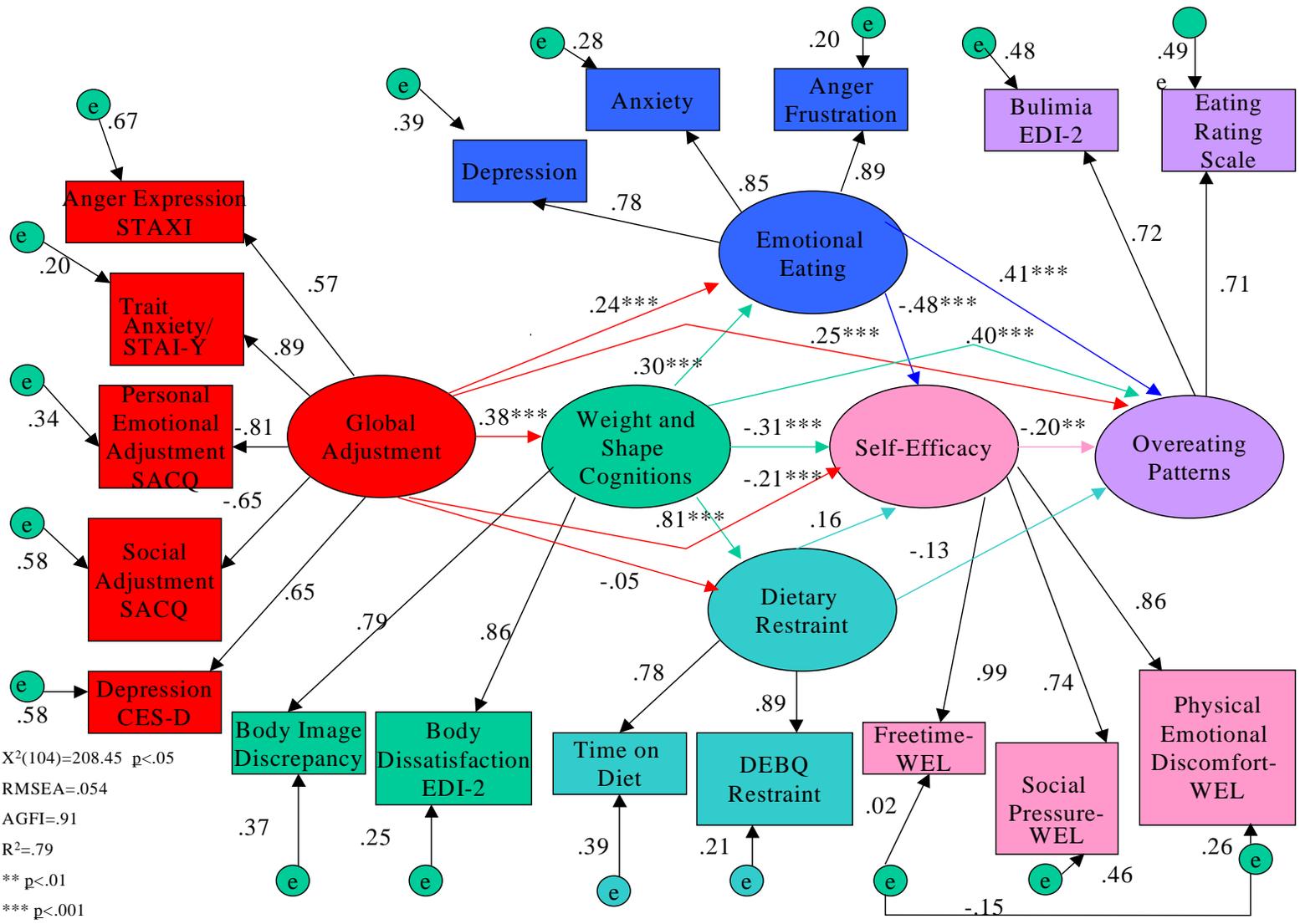


Figure 2. Final model of overeating patterns among normal weight college females with standardized path coefficients and goodness of fit statistics.



### Figure Caption

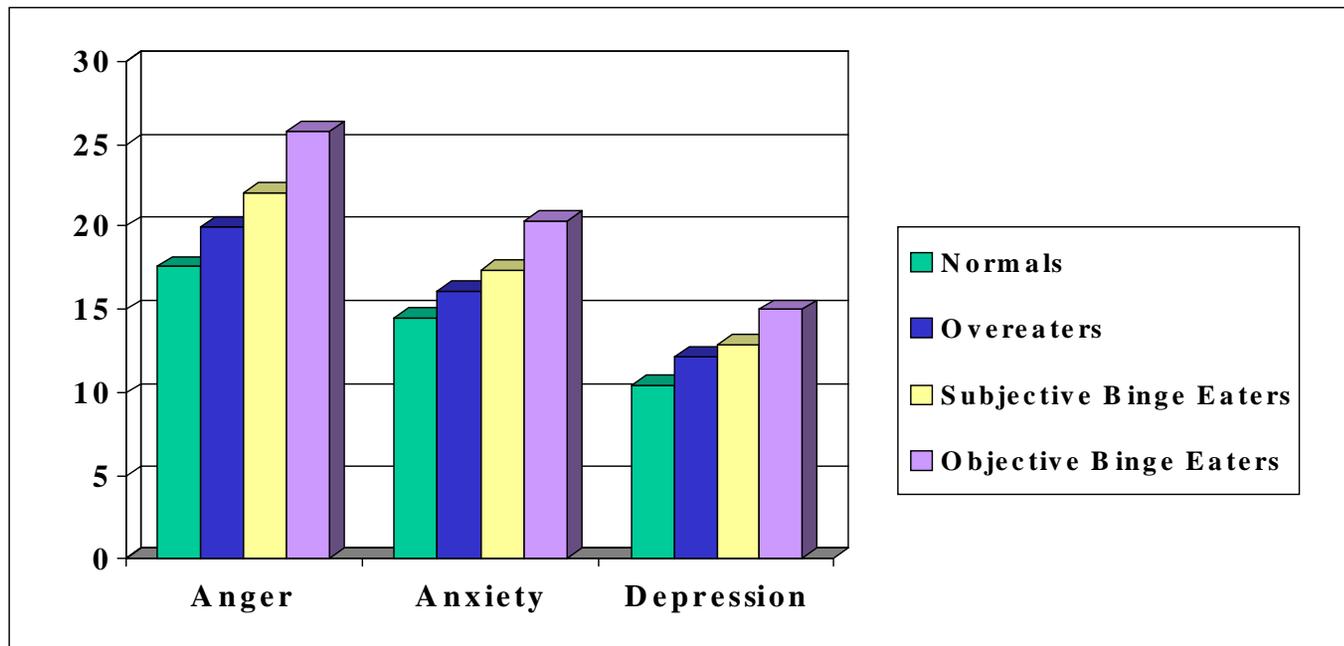
Figure 3. Model of overeating patterns among normal weight college females with dietary restraint - Standardized path coefficients and goodness of fit statistics.



## Figure Caption

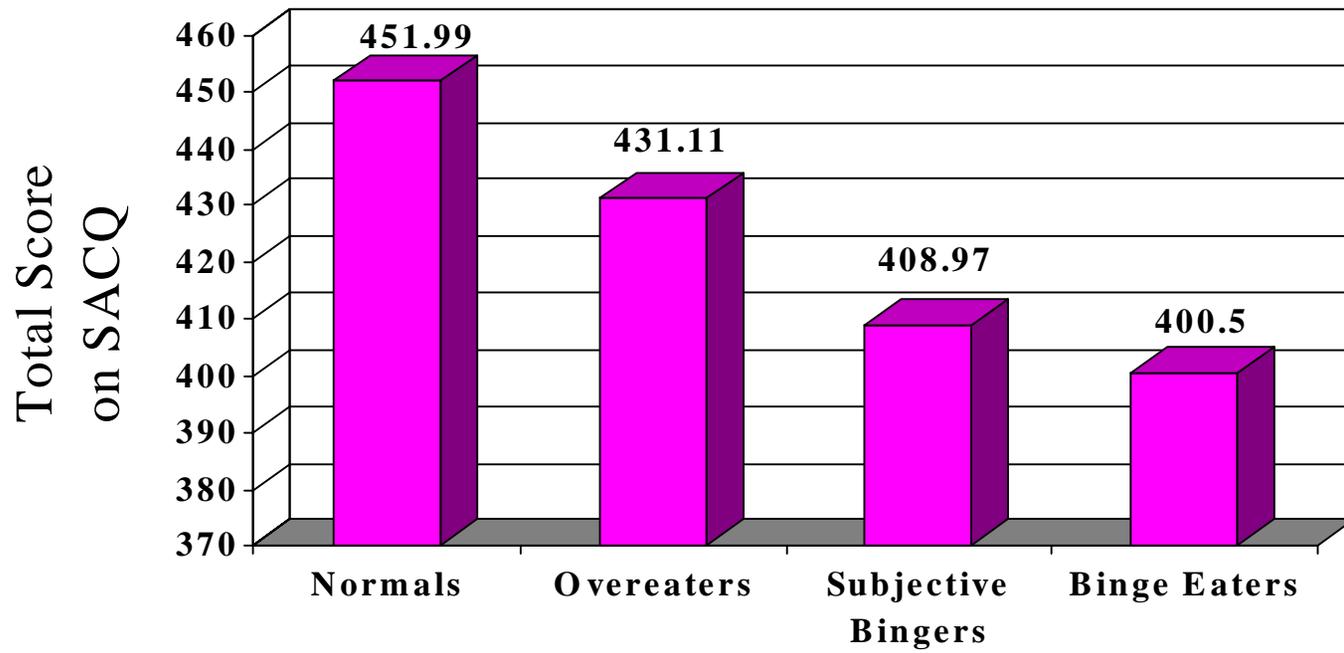
Figure 4. Mean levels of the three factors of emotional eating by eating category subgroup.

## Emotional Eating Scales by Eating Category Subgroup



## Figure Caption

Figure 5. Mean levels of overall college adjustment by eating category subgroup.



## Figure Caption

Figure 6. Mean levels of depression by eating category subgroup.

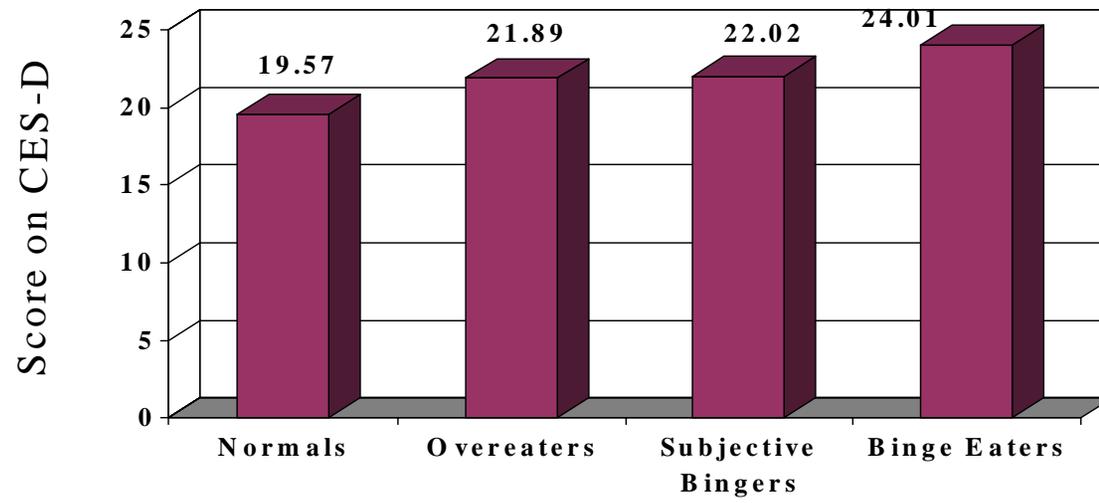
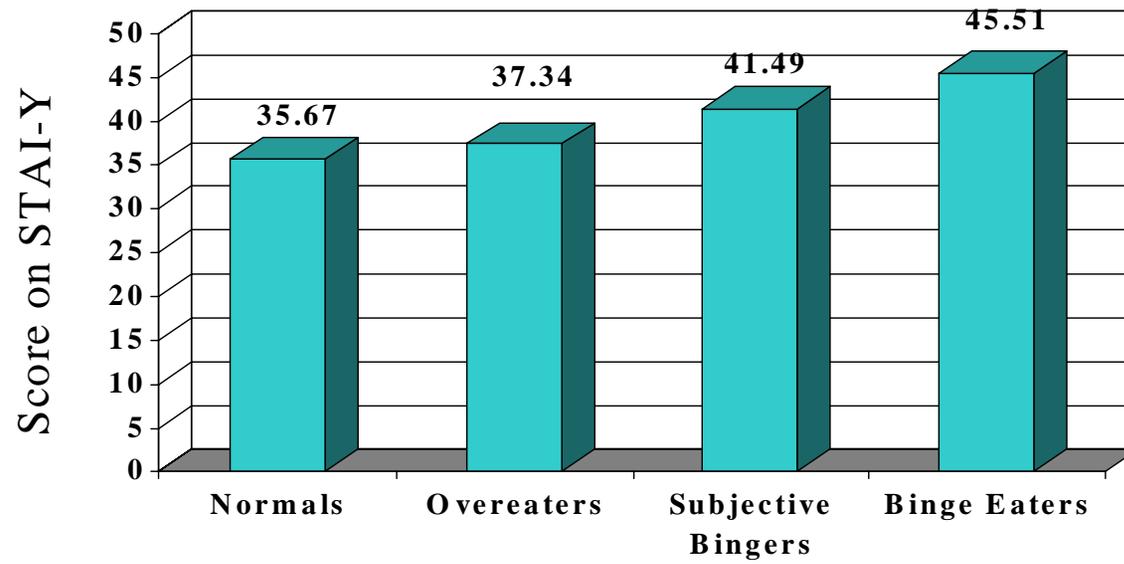


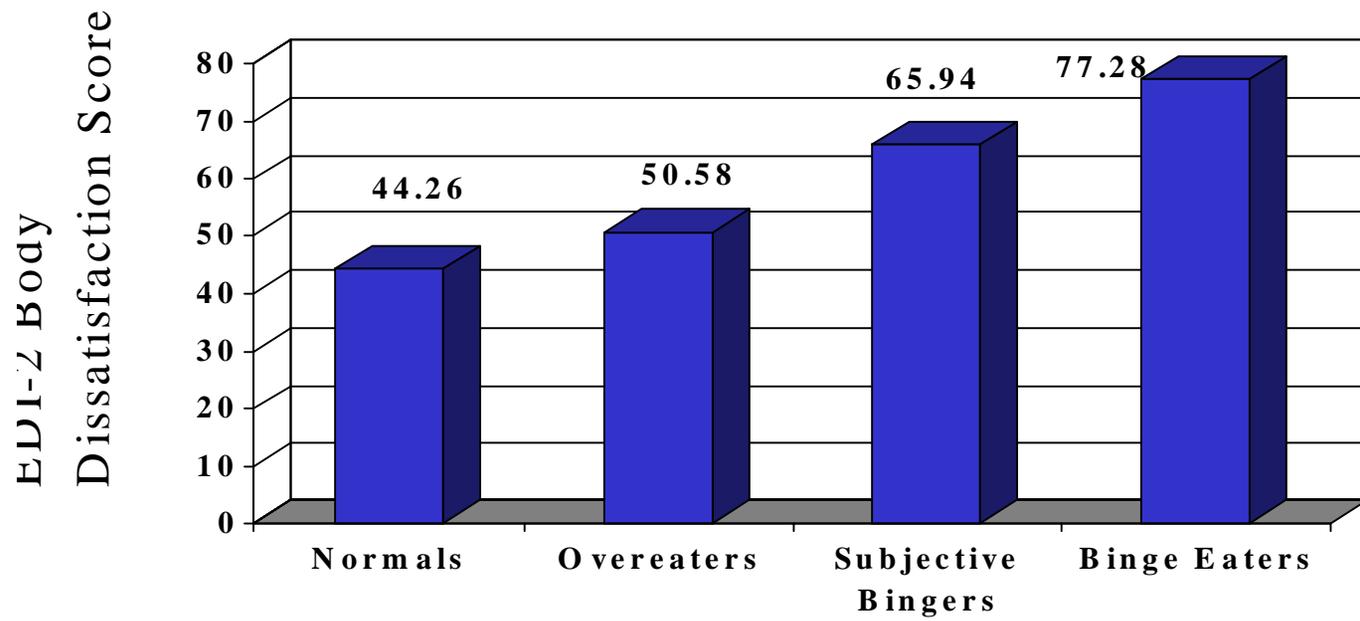
Figure Caption

Figure 7. Mean levels of anxiety by eating category subgroup.



## Figure Caption

Figure 8. Mean levels of body image dissatisfaction by eating category subgroup.



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Appendix A

Eating Patterns Questionnaire

You've just answered a lot of questions about your eating patterns over the last several months. Now, please think about **ONLY** the PAST MONTH. The following questions are going to ask you about your eating patterns during the PAST MONTH ONLY.

**People have different definitions of BINGE EATING. On this questionnaire, a BINGE is defined as eating a large amount of food in a relatively short and discrete period of time AND feeling unable to stop or control how much food you are eating.**

1. Based on this definition of a binge, have you ever binged in the past month? (circle)

**YES**

**NO**

**IF NO SKIP TO # 2**

**IF YES:**

On average, how many **times per week** have you been binge eating in the past month?  
\_\_\_\_\_ (please write in number of times per week)

In the past month, how many **times per week**, on average, did you self-induce vomiting or use laxatives ***immediately following a binge?*** \_\_\_\_\_ (please write in number)

2. Sometimes people *feel like they are binge eating* even when they are not eating a large amount of food because they *feel out of control while eating*. Have you had any episodes like this in the past month? (circle)

**YES**

**NO**

**IF NO SKIP TO # 3**

**IF YES:**

On average, how many **times per week** have you had eating episodes like this in the past month? \_\_\_\_\_ (please write in number)

In the past month, how many **times per week**, on average, did you self-induce vomiting or use laxatives ***immediately following*** an eating episode like this? \_\_\_\_\_ (please write in number)

3. Sometimes people eat an unusually large amount of food in a short period of time but *always feel in control while eating*. Have you had an eating episodes like this in the past month? (circle)

**YES**

**NO**

**IF YES:**

On average, how many **times per week** have you had eating episodes like this in the past month? \_\_\_\_\_ (please write in number)

In the past month, how many **times per week**, on average, did you self-induce vomiting or use laxatives ***immediately following*** an eating episode like this? \_\_\_\_\_ (please write in number)

**Capt Christine Runyan Russ, M.S.**  
**Curriculum Vitae**

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Kingstowne, VA 22315  
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Behavioral Medicine Service  
1050 West Perimeter Road  
Malcolm Grow Medical Center  
Andrews AFB, MD 20762

**Personal Information**

Date of Birth: February 15, 1971  
Place of Birth: Baltimore, Maryland      Citizenship: U.S.A.

**Education**

**1993 - Present**

*Virginia Polytechnic Institute and State University: Blacksburg, Virginia*

Degrees: Master of Science (1995)  
Doctor of Philosophy to be conferred May, 1998  
Program: Clinical Psychology  
GPA: 4.0

**1990-1992**

*University of Maryland Baltimore County: Baltimore, Maryland*

Degree: Bachelor of Arts (1992), Magna Cum Laude  
Program: Bio-psychology  
GPA: 3.86

**1988-1989**

*University of Richmond: Richmond, Virginia*

**Clinical Experience**

**1997 - Present**

**Malcolm Grow Medical Center: Andrews, AFB**

*Psychology Resident*

- Behavioral Medicine Rotation - Case conceptualization and formal assessments; Treating individuals with chronic pain, diabetes, headaches, and obesity with cognitive behavioral techniques and biofeedback
- Conducting Stress Management Group; Insomnia Group, Weight Management Group
- Involved with obesity treatment and diabetes management research programs
- Provided stress management prevention briefings on base
- Conducting neuropsychological evaluations; Case conceptualization and formal assessments
- Will complete 6 month rotation at Outpatient Mental Health Clinic and 4 week rotation on inpatient substance abuse unit

**1996-1997**

**Virginia Polytechnic Institute and State University: Blacksburg, Virginia**

***Graduate Clinician - 240 hours of practicum***

- Primary therapist for several cases - Presenting problems included panic attacks, and agoraphobia, depression, anxiety, family therapy case
- Assessments: clinical interviews, MMPI-2, WAIS-R, SCID-II, ADIS-IV, Adult Attachment Interview, BDI
- Numerous Comprehensive Diagnostic Assessments with ADIS-IV and Adult Attachment Interview
- Four to five hours per week of case conference, case conceptualization, and supervision
- Organized group treatment for panic disorder and agoraphobia; conducted comprehensive assessments for all potential participants
- Primary therapist for panic disorder and agoraphobia group treatment - 8 session group protocol with 6 participants
- Supervising cases for first and second year graduate clinicians

**1995-1996**

**Virginia Polytechnic Institute and State University: Blacksburg, Virginia**

***Graduate Clinician - 250 Practicum Hours***

- Self-initiated practicum beyond requirements
- Primary therapist for ongoing cases - Presenting problems included depression, sexual orientation issues, and familial conflict
- Group Therapy for Physically and Emotionally Abused Women: Primary facilitator and organizer for a cognitive-behavioral and support group
- Co-facilitator of small group sessions emphasizing skills training, problem solving, and effective communication with low income, primarily minority, women living in federal housing projects; conducted multiple groups with 8-10 women per group
- Leader of community coalition for HIV prevention in subsidized housing development
- Comprehensive personality assessments with MMPI-2, Thematic Apperception Test, and Rorschach (Exner System)
- Administered and scored 100 MMPI-2s, EDI-2s, SCL-90s
- Two hours per week of case conference and case conceptualization

**Summer, 1995**

**Johns Hopkins Hospital; School of Public Health: Baltimore, Maryland**

***Clinical Psychology Extern - 480 Practicum Hours***

- Structured Family Interviews and Assessments
- Structured Clinical Interviews - Diagnostic Interview Schedule
- Development of program evaluation for a facility treating primarily foster care children and their families, staff training, and procedural training
- Follow-up assessments with adolescents regarding health care utilization and current health status

**1994-1995**

**Virginia Polytechnic Institute and State University: Blacksburg, Virginia**

***Graduate Clinician - 480 Practicum Hours***

- Primary therapist for ongoing cases - Presenting problems included eating disorders, depression, interpersonal problems, ADHD child, behavioral acting out in child, anxiety
- Child and Adult Intellectual, achievement, and learning disability assessments; Assessment instruments included WAIS-R, WISC-III, Woodcock-Johnson, WIAT, CPT, VMI, Bender
- Five to six hours per week of case conference, case conceptualization, and supervision
- Co-facilitator of small group sessions emphasizing skills training, problem solving, and effective communication with low income, primarily minority, women living in federal housing projects; conducted multiple groups with 8-10 women per group
- Facilitator of small group primary prevention teaching breast self-examination

**1993-1994**

**Virginia Polytechnic Institute and State University: Blacksburg, Virginia**

***Graduate Clinician - 240 Practicum Hours***

- Primary therapist for ongoing psychotherapy cases - Presenting problems included depression, relationship problems, eating disorders, stress, and scholastic problems
- Adult and Child intellectual, achievement, and learning disability assessments; Assessment instruments included WAIS-R, WISC-III, Woodcock-Johnson, WIAT, CPT, VMI, Bender
- Four hours per week of case conference, case conceptualization, and supervision

**1992-1993**

**Johns Hopkins Hospital; Department of Psychiatry: Baltimore, Maryland**

***Interviewer - Structured family history interviews***

**Teaching Experience**

**Virginia Polytechnic Institute and State University: Blacksburg, Virginia**

**1996**

***Guest Lecturer***

- Delivered guest lecture to Health Psychology course regarding HIV/AIDS prevention

**1995**

***Introductory Psychology Lecture Assistant***

- Assisted primary professors with lectures; Developed exam questions; Conducted exam review sessions for students; Proctored exams; Introductory Psychology office assistant

***Guest Lecturer***

- Delivered guest lectures to Abnormal Psychology courses regarding the assessment and treatment of eating disorders

#### ***General Clinical Skills Training Workshop***

- Developed and delivered a four session introduction to clinical skills workshop to first year graduate students

**1994**

#### ***Introductory Psychology Lab Instructor***

- Primary instructor for two labs; Facilitated discussions; Prepared lectures; Developed quizzes; Proctored exams.

### **Research Experience**

**1993 - 1997**

#### **Virginia Polytechnic Institute and State University: Blacksburg, Virginia**

##### ***Dissertation Research***

- Structural Equation Model of Binge Eating Among College Women; An exploration of potential mediating mechanisms to predict binge eating in the absence of inappropriate compensatory strategies; Currently involved with data analysis and manuscript preparation

##### ***Co-Director of Virginia Health Care Foundation Grant***

- Conceptualization, development and implementation of an innovative www-based nutrition intervention for rural high school students; Conducting focus groups, measurement development, assessments, and implementing intervention; Currently involved with data analysis and manuscript preparation; Preliminary research presented at the Association for the Advancement of Behavior Therapy annual conference, 1997

##### ***Independent Research Project - Binge Eating in College Women***

- An exploration of personality factors and other psychopathology associated with binge eating among college women; Administered diagnostic questionnaires as well as MMPI-2; SCL-90; BDI; EDI-2 to 100 college females; Research presented at the Association for the Advancement of Behavior Therapy annual conference, 1996

##### ***Preliminary Examination Research***

- Conducted a meta-analysis regarding treatment effectiveness for binge eating disorder

##### ***Master's Thesis Research***

- Small group behavioral intervention promoting breast self-exams among minority women living in subsidized housing; Research presented at the Society of Behavioral Medicine annual conference, 1996; Received Citation Poster Award

***Master's Thesis Title:*** Adoption of Breast Self-Examination Among Socio-Economically Disadvantaged Women Living in Subsidized Housing Developments: The Effect of Prompting, Self-Management, Feedback, and Supplementary Training.

***HIV Prevention: Roanoke City Housing Projects - NIMH Grant***

- Participated in both conceptualization and implementation aspects of this project; Five cities, 20 housing projects were involved; Conducted assessments; Recruitment; Implemented intervention; Leader of Women's Health Council which organized and implemented ongoing HIV prevention activities following the small group interventions for one year

***The Effects of Condom Availability on Sexual Behavior Among College Students***

- Participating in recruitment, assessment, and implementation of intervention exploring the influence of increasing availability of condoms in college students

***Skin Cancer Prevention: American Cancer Society Grant***

- Conducted assessments and community behavioral intervention promoting sun protection among lifeguards and pool patrons at local swim clubs; Research presented at the Society of Behavioral Medicine annual conference, 1996

***Exercise Promotion in the Elderly***

- Recruitment; Assessments; Group facilitator for small group intervention emphasizing personal planning and goal setting; Conducted six small group intervention session with a total of 60 participants

**1992-1993**

**Johns Hopkins Hospital; Department of Psychiatry: Baltimore, Maryland**

***Research Assistant***

*The Etiological Contribution of Genetics in Manic Depressive Illness - NIMH Grant*

- Ascertained and assessed families from outpatient and inpatient clinics; Conducted family history interviews focused on the identification of familial psychopathology, specifically affective disorders; Organized and facilitated data collection

**1991-1992**

**University of Maryland Baltimore County: Baltimore, Maryland**

***Research Assistant:***

*Linguistic and Social Contexts of Laughter in Conversation*

- Project conceptualization; Data collection and analysis; Research presented at the Society for Neuroscience annual conference, 1992

**Graduate Coursework:      GPA 4.0**

***Core Psychology Courses:***

Research Methods  
 Statistics for Social Sciences I  
 Statistics for Social Sciences II  
 Developmental Psychology  
 Personality Processes  
 Biological Bases of Behavior

***Clinical Psychology Courses:***

Intellectual Assessment  
 Behavioral Assessment and Treatment  
 Community Psychology  
 Adult Psychopathology  
 Advanced Psychotherapy  
 Personality Assessment  
 Health Psychology  
 Child Psychopathology  
 Advanced Seminar in Professional Ethics  
 Independent Study on Women's Health

**Honors/Awards**

1996 Society of Behavioral Medicine Annual Convention - Citation Poster Award  
 Phi Kappa Phi Honor Society - Virginia Tech Chapter  
 Psi Chi, Psychology Honor Society - University of Maryland Chapter

**Other Professional Activities**

***Service Activities***

Virginia Tech, Dept. of Psychology - Honor Board (1994 - 1997)  
 Virginia Tech, Dept. of Psychology - Clinical Student Representative  
 (1995-1996) American Cancer Society Breast Self-Exam Training Facilitator

***Guest Reviewer for Peer-Reviewed Journals***

Journal of Applied Behavior Analysis  
 Journal of Gender, Culture, and Health - 3 reviews  
 Journal of Clinical Child Psychology

***Professional Organizations***

American Psychological Association - Student Member  
 Society of Behavioral Medicine - Student Member  
 Association for Advancement of Behavior Therapy - Student Member  
 American Public Health Association - Student Member

**Publications**

Russ, C. R. & Winett, R. A. Adoption of Breast Self-Examination Among Socio-Economically Disadvantaged Women: The Importance of Caregiver Contact. Journal of Gender, Culture, and Health, 1 (4), 309-317.

Winett, R. A., Cleaveland, B. L., Tate, D. F., Lombard, D. N., Lombard, T. N., Russ, C. R., & Galper, D. (1997). The Effects of the Safe-Sun Program on Patrons and Lifeguards Skin Cancer Risk Reduction Behaviors at Swimming Pools. Journal of Health Psychology, 2 (1), 85-95.

### **Presentations**

Russ, C. R. (1997). Factors related to eating patterns among a sample of normal weight college women: Evidence for a continuum model of eating behaviors. Research presented at the Uniformed Services University of Health Sciences annual research conference.

Robinson, C. R. & Russ, C. R. (1997). Attrition in obesity treatment programs: A survival analysis. Research presented at the Uniformed Services University of Health Sciences annual research conference.

Robinson, C. R. & Russ, C. R. (1997). An introduction to pain management with a case example: Managing the chronic pain patient with cognitive-behavioral interventions. Grand Rounds presented to Malcolm Grow Mental Health Flight, Andrews Air Force Base.

Russ, C. R., Tate, D. F., Whiteley, J. A., & Winett, R. A. *Smoking Status, Physical Activity, and Dietary Patterns Among Rural Adolescents: Implication for Intervention*. Research presented at the Association for the Advancement of Behavior Therapy annual conference, 1997. Miami, FL.

Tate, D. F., Russ, C. H., Whiteley, J. S., & Winett, R. A. *Development of a Self-Efficacy and Outcome Expectancy Measure for Dietary Change Among Rural Adolescents*. Research presented at the Association for the Advancement of Behavior Therapy annual conference, 1997. Miami, FL.

Russ, C. R. & Winett, R. A. (1996). *Adoption of Breast Self-Examination in Socio-economically Disadvantaged Women: The Effect of Prompting, Self-Management, Feedback, and Supplementary Training*. Research presented at the Society of Behavioral Medicine annual conference, 1996. Washington, DC.

Winett, R. A., Cleaveland, B.L., Tate, D.F., Russ, C. R., Galper, D. I., Lombard, D. N., & Lombard, T. N. (1996). *Promoting Skin Cancer Risk Reduction at Swimming Pools: The Safe-Sun Project*. Research presented at the Society of Behavioral Medicine annual conference, 1996. Washington, DC.

Russ, C. R., Tate, D. F., & Sullivan, K. (1996). *Personality Factors and Other Psychopathology Associated with Binge Eating Among College Women*. Research presented at

the Association for the Advancement of Behavior Therapy annual conference, 1996. New York: New York.

Provine, R. R., Greisman, L. A., & Runyan, C. N. (1992). *Laughter Punctuates Speech: Linguistic and Social Contexts of Laughter in Conversation*. Research presented at the Society of Neuroscience annual conference, 1992.

### **Manuscript Submitted to a Refereed Journal**

Russ, C. R., Tate, D. F., Whiteley, J.A., Winett, R. A., Winett, S. G., and Pflieger, J. *The Effects of a WWW-Based Health Behavior Program on the Nutritional Practices of Tenth Grade Girls: Report on the Eat-4-Life Prototype*.